

# The Boston Medical and Surgical Journal

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## Original Articles.

### THE TREATMENT OF OSTEOMYELITIS.

By CHANNING C. SIMMONS, M.D., BOSTON.

Assistant Visiting Surgeon, Massachusetts General Hospital; Assistant in Surgery, Harvard Medical School.

Two years ago I reported the end-results of 97 consecutive cases of osteomyelitis, 82 of which were of the infectious type, the other 15 being secondary to sepsis, compound fracture, syphilis, etc. Since then I have had opportunity to operate on 58 other cases as follows:

Acute .....	13
Acute periosteal .....	1
Bone abscess, less than 1 yr. duration ....	6
Chronic (bone destruction) less than 1 yr. ..	6
Old chronic .....	16
Old bone abscess .....	4
Secondary .....	13
Hematoma, etc. ....	3

I intend to discuss the cases (22) of less than one year's duration only, as this is the period during which the disease can be cured if it is properly treated. It is, unfortunately, often overlooked, especially the mild type, and when recognized, an inadequate operation is done. We have all seen the hospital derelicts with chronic osteomyelitis, who drift from one hospital to another, requiring some sort of an operation once in six or eight months, and it is hard to realize that if these cases had had proper treatment at the outset many would have been cured.

I see no reason to change the conclusions given in a previous paper,<sup>1</sup> namely:

1. In children with pain in a limb and evidence of toxemia, always consider osteomyelitis.
2. Operate early, even if the symptoms are rather vague. If the diagnosis is incorrect, practically no harm is done; while if correct, a great deal of suffering may be avoided.
3. In acute cases, open to the medulla and pack the wound. Prognosis good. The treatment and prognosis varies of necessity somewhat in these early cases, but in general the earlier the operation, the better the prognosis.
4. In cases where bone destruction has taken place, seen less than three months after the onset of the disease, perform subperiosteal resection when possible. Prognosis good.
5. In chronic cases of bone abscess of less than one year's duration, open and pack. Prognosis good.
6. In chronic cases, with bone destruction of less than one year's duration, remove sequestrum and pack. Prognosis good.
7. In old chronic cases, either with bone destruction or of the bone abscess type, remove necrotic areas and drain. Try to obliterate the cavity with flaps of living tissue. If this cannot be done, either use bone wax, pack, or sterilize the cavity; allow it to fill with blood clot, and close without drainage. The prognosis, if the cavity can be obliterated, is fair, otherwise poor.
8. The treatment, when such bones as the pelvis are involved, is unsatisfactory, and the prognosis problematical.
9. When, in old chronic cases, the whole

shaft of a long bone is badly diseased, the possibility of resection of the entire shaft, with bone transplantation, should be considered before amputation is resorted to.

The following classification was adopted, and, while it is not based on the pathology, it is of value as a guide to the treatment to be instituted in a given case. At first glance it seems cumbersome, but in studying the cases they will be found to fall readily into one of the groups.

CLASSIFICATION.	
Acute	
Central	
Diffuse	
Fulminating	
Ordinary type	
Local	
With bone destruction	
Mild type (bone abscess)	
Periosteal	
Epiphysitis	
"Secondary" (tuberculosis, syphilis, etc.)	
Chronic	
Central	
Diffuse	
6 to 10 weeks' duration.	
3 to 12 months' duration	
Many years' duration	
Local (with bone destruction)	
6 to 10 weeks' duration	
3 to 12 months' duration	
Many years' duration	
Local (bone abscess type)	
To one year duration	
After one year	
"Resting" cases	
Periosteal	
Epiphysitis	
"Secondary"	

As regards prognosis, the disease may be divided into two main classes,—less than one year's duration and over one year's duration. The time limit—one year—is arbitrary, but is substantially correct. The point is that, after about one year the bone loses its power to regenerate, and if abscesses are opened or sequestra removed, it has not the power to fill in the defect. I believe that any case seen less than one year from the time of onset should be cured by operation, although there are exceptions. This statement does not apply when a flat bone, such as the ilium, is diseased, and is not always applicable to osteomyelitis of the femur or in certain multiple cases. In this series a flat bone was involved only twice—the ilium and the scapula. Both of these cases are now well, but ran a very stormy course. The principle of operation is the same,—open and drain early and do sequestrectomy as soon as possible.

CASE 122. Osteomyelitis of scapula. Female, 18 years old. Sprained shoulder, "fooling" five days ago. Two days later an attack of pain in the right shoulder, and has been in bed since with chills and fever. *Examination.*—Right shoulder held rigid. Swollen and tender, the tenderness being most marked over the border of the scapula. Temperature, 102; pulse, 120; white count, 20,000. Wassermann and Neisser test negative. The condition was thought for three days to be a Neisser

infection of the shoulder. *Operation* ten days after onset. Large abscess opened about scapula, which was bare of periosteum. *Culture*, staph. albus. Five subsequent operations for pus pockets and the removal of sequestra were necessary and the woman was very sick for some time. A bone abscess of the fibula also developed and was drained. Eighteen months after operation she was well, but the shoulder was stiff.

Osteomyelitis is diffuse or local, that is, the entire shaft of a bone may be destroyed or a portion only. The local form is by far the more common. I believe that in certain cases the infecting organism is so attenuated that the process may heal spontaneously, without bone destruction or even the formation of an abscess. Mild attacks of monarticular rheumatism, or "growing pains" may represent mild infections.

The amount of bone destroyed depends on the virulence of the infecting organism, the resistance of the individual, and to some extent on the portion of the bone involved. The seat of the infection may be in any part of the bone, usually at the epiphyseal end of the diaphysis. It may be under the periosteum, in the cortex, or in the spongy medulla. If in the medulla,—the common seat,—the pus, following the line of least resistance, extends down the canal for a varying distance, destroying the bone, before it breaks through the cortex. After breaking through the cortex, the periosteum is stripped up, until this in turn breaks, and an abscess is formed in the soft parts. If the operation is done early, and the pus given vent before it has extended far in the medullary canal, part of the bone may be saved.

If the organism is of low virulence, the process may become localized in the head of the bone and break through the cortex early, or it may form a chronic abscess with the destruction of very little bone. In these cases the cavity becomes walled off, there may be no discharge of pus, and the symptoms of "rheumatism" gradually subside as the abscess becomes sterile. Later there are recurring attacks of pain, usually following trauma, a cold, or other general infection. The cases in this series show the difference in virulence of infection. Case 115 died in two days of septicemia (staph. aureus), while in Case 149 (streptococcus) the symptoms were rather mild and of four weeks' duration.

The x-ray is of absolutely no value in acute osteomyelitis, except to exclude scurvy or syphilis. X-rays only show change in density, and until new bone is formed or old destroyed, no variation from the normal is seen. The first changes are usually observed in two or three weeks, and no reliance should be placed on the x-rays before this. After the acute stage is passed, the x-ray is absolutely necessary, and treatment of the bone is practically based entirely on them. They should be taken at frequent intervals, and always interpreted by an

expert in personal consultation with the surgeon, who also should be able to draw some conclusions from them himself.

**Treatment.** The cases were treated in the routine way, and operated upon as soon as the disease was suspected. A tourniquet was always used, as with it a much better idea of the condition of the bone may be obtained. It is also of value in preventing fat embolism which is seen after bone operations. To my knowledge, I have never seen a case. An incision is carried through the periosteum, and an opening made into the medulla with a burr or trephine. This should always be done, even if there is pus in the soft parts and under the periosteum. If the medulla is diseased, an opening should be made below the first, and still others below this until normal appearing marrow is reached. Never curette, as this spreads the infection and destroys any endosteum remaining alive. The wound is then packed. If the bone dies, a second operation, subperiosteal resection or sequestrotomy, is done in from four to ten weeks, depending on the bone and the rapidity of formation of the involucrum. In the femur and flat bones it is necessary to wait until considerable involucrum has formed, following the changes with the x-ray, but the sequestrum should be removed at the earliest possible moment. Other minor operations for the removal of small sequestra, which have formed later or which have been overlooked, are the rule, but if the case is carefully followed they can be done early and amount to little.

The results of these cases show the value of early treatment. Of the fourteen acute cases, two died at once of septicemia and two have not been traced. Of the remaining nine, prompt operation resulted in cure without bone destruction in three, and the other seven are well from one to two and a half years after the second operation of sequestrotomy or resection. Of the eight cases seen, from one to four months after the onset of the disease, six are well, one has not been traced, and one, a femur, is still draining.—I doubt if he will ever be well.

The bacterium causing osteomyelitis is, of necessity a blood-borne organism, and the disease implies a septicemia. This is now known to be much more common than was formerly supposed. The cultures from the acute cases were as follows:

Staphylococcus albus .....	1
Staphylococcus aureus .....	8
Streptococcus .....	2
Sterile .....	1
Culture not planted .....	2

In the case reported as sterile I think the swab must have been allowed to dry, as thick pus was found.

There were two fatal cases, and in these the culture was staph. aureus. It is interesting to note that in the two cases where the culture showed streptococcus (Cases 145, 149) the

symptoms were of a low-grade infection of three and four weeks' duration, respectively.

**CASE 115.** Male, 17 years old. Two weeks ago bruised shin while in swimming. Three days ago had a severe attack of pain just below the left knee, which has persisted. Considerable fever. *Examination.*—Very sick boy. A hot, red, tender swelling over the upper third of the left tibia. Temperature, 105.6; pulse, 130; x-ray, negative. *Operation.*—Large intermuscular abscess opened, and pus found on trephining the bone in the medullary cavity. *Culture.*—Staph. aureus. The following day the other tibia was operated upon for osteomyelitis, and the patient died 48 hours after the first operation.

**CASE 134.** Male, 9 months. Two days ago the mother noticed the left arm was swollen, and since then the child has been very restless and feverish.

*Examination.*—Left arm swollen and very tender from the shoulder nearly to the elbow. Temperature, 104; pulse, 130; white count, 23,600; x-ray negative. *Operation.*—Abscess in the soft parts opened and two burr openings made in the upper end of the humerus. Pus found in the medulla. The child died on the second day with a temperature of 106.8. *Culture.*—Staph. aureus.

The etiological data is similar to that in all other series of cases.

<i>Cause</i>	Trauma .....	10
	Secondary to otitis media .....	2
	Septic finger .....	1
	Exposure .....	1
	None .....	8

*Bone involved* (Cases where several were infected are classified as the first attacked)

Tibia .....	7	Radius .....	4
Femur .....	3	Ulna .....	3
Humerus .....	3	Fibula .....	1
Scapula .....	1	Ilium .....	0

Single bone only ..	18 cases
Multiple bones ..	4 "
Localized .....	18 "
Diffuse .....	4 "

#### Ages

1-5 years .....	4
5-10 " .....	5
10-15 " .....	6
15-20 " .....	5

Males, 15 cases; Females, 7 cases.

Average duration of acute cases before operation, 8.6 days.

*Analysis of Acute Cases* (14 cases). Local osteomyelitis with no bone destruction, two cases (135, 140).

These were typical cases of a mild infection, operated upon early enough to ward off bone destruction. The diagnosis is always obscure, and a certain number of cases will be operated upon where it is wrong. If the disease is not present, the wounds heal promptly, while if it is, much suffering and loss of time are avoided. I have operated upon 40 cases of acute osteomyelitis, some on very slight evidence, and the diagnosis has been correct in all but the last two, done recently. In all the others pus was

found or a positive culture obtained from the marrow. Early in these cases frank pus is not found, but the marrow is dark chocolate colored, and the culture is positive.

CASE 140. Female, 7 years. Pain in right knee, coming on without cause, for two days. Walks with a limp. *Examination*.—Upper end of tibia distinctly thickened and tender. Temperature, 101; pulse, 120; white count, 15,000. *Operation*.—Periosteum thickened. Medulla contained a small amount of thick pus. The wound healed in four weeks and the patient was perfectly well one year later.

CASE 135. Female, 6 years. Complained of pain in the arm six days ago. This has persisted and child has been very fretful. *Examination*.—Left forearm swollen and tender just above the wrist. Temperature, 102; white count, 11,000; x-ray, negative. *Operation*.—Two burr openings made in the lower end of the ulna and pus found in the medulla. Packed. *Culture*.—Staph. aureus. Well thirteen months later.

The following three cases were seen, in which the diagnosis of osteomyelitis had been erroneously made. One was not operated upon, as hematoma appeared to be the most likely diagnosis, and this proved to be correct (Case 148). The other two were operated upon, as the evidence was so much in favor of osteomyelitis. No pus was found, however, and the culture was sterile in both. I should not hesitate to operate upon cases with similar stories at any time (Cases 152, 155).

CASE 148. Female, 7 years. As far as could be determined, the child was injured three weeks previously while coasting. Since then she has walked lame and has been restless and feverish. *Examination*.—Sick-looking child. In the left iliac fossa was a tender, semi-fluctuant mass, running up towards the kidney. Thigh held flexed. Motions of hip joint normal. Urine normal. Temperature, 100; pulse, 128; white count, 26,000; x-ray, negative. Two days later the temperature was normal and the white count had dropped to 12,500. The mass in the course of two weeks slowly disappeared and the symptoms subsided without operation. Diagnosis, hematoma.

CASE 152. Female, 11 months. Operation for mastoiditis six days ago. Yesterday the left elbow became swollen and tender and the temperature rose. *Examination*.—A brawny swelling over the lower end of the left humerus, which was quite tender. Temperature, 99; pulse, 130; white count, 20,000; x-ray, negative. *Operation*.—Lower end of left humerus trephined. No pus found in the medulla or soft parts. *Culture*.—Sterile. Wound closed in four weeks.

CASE 155. Female, 6 months. Hit thigh two weeks ago. Five days later apparently had pain in that thigh. Has been restless and lost weight. *Examination*.—Localized tenderness at upper end of left femur, with some thickening about trochanter. Motions limited. Temperature, 99; pulse, 120; white count, 15,000; x-ray negative. *Opera-*

*tion*.—Incision to trochanter, and medulla opened. No pus found. *Culture*.—Sterile. The wound closed in about four weeks.

*Acute periosteal osteomyelitis*. One case. This case is typical of the periosteal type. The cases are comparatively mild, and if there is any bone destruction it is usually only a flake off the cortex. Simple incision and drainage usually effects a cure.

CASE 105. Male, 2 years. Otitis media two months ago. One month ago a tender swelling appeared on the right wrist, which has slowly increased in size. *Examination*.—Poorly nourished child. Fretful. Tender fluctuant swelling over lower end of left ulna. Motion of wrist normal. X-ray shows periostitis lower end of ulna. *Operation*.—Abscess with half ounce pus opened and bare bone felt. *Culture*.—No growth. Wound healed in about four weeks. No further data.

Of the remaining nine cases, one has been lost track of, and in the other eight the process went on to bone destruction. Four had the operation of subperiosteal resection performed, while in four sequestrotomy only was done.

#### Cases in which sequestrotomy was performed:

CASE 114. Male, 14 years. Infectious arthritis two years ago. In May, 1914, a tender swelling developed over the ilium, and he was operated upon for osteomyelitis of the ilium. Seen by me two months later, with history of pain in the right shoulder and swelling with some fever, of four days' duration. *Examination*.—Right shoulder held stiff, very tender, and swollen. Temperature, 100; pulse, 140; white count, 19,000. *Operation*.—Two burr openings made in upper end of humerus, and pus found in medulla. Sequestrum was discharged later and wound healed in four months. In May, 1915, an abscess formed over the upper end of the left femur, which was opened, but the medulla appeared normal. Well, 14 months later. (I should not be surprised if this boy had more trouble with the disease of the ilium).

CASE 116. Male, 12 years. Two weeks ago had a septic finger. Two days ago had a sudden attack of pain in the right ankle, with chills and vomiting. *Examination*.—Tenderness over lower portion of left tibia. Some swelling. Temperature, 101; pulse, 120; white count, 18,000; x-ray negative. *Operation*.—Burr openings made in the lower end of the tibia and pus found in the medulla. *Culture*.—Staph. aureus. Two months later sequestrotomy of the lower end of the tibia was done. Four months after the first operation was done, a large abscess formed in the upper part of the left thigh, and burr openings made in the trochanter showed pus in the medulla. Patient had severe pyelitis and a very stormy recovery. He was in the hospital five months. A year later all wounds were solid and he walked without a limp. Blood culture was positive in this case.

CASE 122. Osteomyelitis scapula. Previously cited.



CASE 133. Male, 5½ years. One week ago, child fell, injuring his forearm, and since then has not used it. Complaints of considerable pain and has some fever. *Examination*.—Upper third of left forearm hot and swollen. Very tender. Motions of joint free. Temperature, 100.8; pulse, 140; white count, 14,000; x-ray, negative. *Operation*.—Incision over upper end of ulna, and two openings made into medulla. Pus found. Two months later a small sequestrum was removed, after which the wound healed. Well one year later.

**Multiple Osteomyelitis.** There were four cases of multiple osteomyelitis which are illustrative of what may happen in this disease (Cases 115, 116, 114, 122—all previously cited). Case 115 is the type of an overwhelming septicæmia, with death in a few days. Case 116 illustrates septicæmia and osteomyelitis following slight superficial sepsis, and it and Case 122 illustrate the length of time that may elapse between the appearance of the acute infection in different bones. I have had other cases where a second, apparently acute, focus was operated upon one year after the first. The infection may have occurred in these cases at the time of the acute onset of the disease and remained quiescent. In one case a bone abscess was discovered by accident, in taking an x-ray of the chest, which had never caused symptoms. These four cases are all well over one year from the date of operation, but as it has been impossible to obtain x-rays, I am rather skeptical about some of them being cures.

**Chronic Osteomyelitis**, less than one year's duration (eight cases). Eight cases were seen after the acute stage had passed, and can be divided clinically as follows:

Bone abscess .....	2 cases
Bone destruction (local) .....	4 "
Bone destruction (diffuse) .....	2 "

These cases were all seen inside of four months from the onset of the disease. All but one had been operated upon and the abscess drained, or it had broken spontaneously.

**Bone abscess**, two cases (Cases 100, 120). These were mild local infections, with symptoms of rheumatism. The temperature in both was normal, but they showed a leucocytosis. The diagnosis was made by the x-ray, and at operation a bone abscess was found, filled with a thick pus. Cultures were taken in both instances, but through an error were not planted. Case 100 was well thirteen months later, while Case 120 was not traced. This case was an abscess of the center of the shaft of the humerus, which is one of the few bones where the disease often comes in the shaft and not at the epiphysis.

CASE 100. Male, 11 years. Twelve weeks ago received a blow on the ankle. The joint soon became sore and was poulticed, following which an abscess broke. The wound has discharged since. *Examination*.—Lower end of tibia thickened with the opening of a sinus. X-ray shows an abscess cavity with some periostitis. *Operation*.—Abscess lower



FIG. 1. Case 100. Acute bone abscess of the lower end of the tibia of several weeks' duration. Male, 11 years old. There is some periostitis and the abscess cavity is plainly seen. As the abscess is of short duration there is little elevation of the surrounding bone. This type of abscess is cured by simple incision and drainage while the chronic abscess is not.

end of tibia, opened and packed. Considerable cortex cut away. Wound healed in two months. Well thirteen months later.

CASE 120. Male, 34 years. An attack of pain, without cause, in the center of the left arm five weeks ago, which has persisted, and is worse at night. No fever. Has had to give up work. *Examination*.—Thickened area at center of right humerus, 4 in. long. Some local heat and marked tenderness. X-ray shows osteomyelitis center of humerus, with two abscess cavities, and much new bone formation. Temperature, 98.6; white count, 12,000. *Operation*.—Two abscess cavities in medulla, filled with thick pus, drained. Much cortex cut away. Wound packed. Healed in two months. No further data.

Of the other six cases, in four sequestrotomy was done, and in two subperiosteal resection of the entire shaft. Sequestrotomy was done in three cases of disease of the femur where resection was impossible, and in one of osteomyelitis of the ulna, where it was all that was indicated.

Of the three cases of osteomyelitis of the femur, two are well and one has a discharging sinus 20 months later. I doubt if he is ever cured (Case 132). This case illustrates the difficulty of treating the disease in the femur. I also think there is more hope of curing young children and infants than adults.

CASE 132. Male, 17 years. On February 3, 1915, had an attack of pain in the lower end of the femur, and went to bed with a high fever. He was treated for two weeks for typhoid, and then seen by a surgeon, who immediately operated for osteomyelitis, opening the medullary cavity of the femur. Two months later I operated upon him, removing many large sequestra and opening several abscesses. Since then he has had a discharging sinus, leading to a cavity in the lower end of the femur. Another surgeon curetted it once, and I have operated upon him once, and attempted to cut away the sides

of the cavity, and thus obliterate it. He still has a discharging sinus, 21 months after the first operation.

In the other two cases of osteomyelitis of the femur, the child was somewhat younger, and the infections less virulent. They are classed as cures, but x-rays were not obtained, and the possibility of a resting bone abscess should be considered. These resting abscesses may persist without symptoms for many years, only to become acute after some general infection.

CASE 107. Female, 14 years. Hit thigh 11 months ago, and was in bed one month with abscess of femur. Since then a sinus has persisted, and the patient walks with a limp. *Examination.*—Motions of knee limited. X-ray shows much new bone formation about lower third of femur, with several abscess cavities and sequestra. *Operation.*—Much involucrum removed and several large sequestra. Whole cavity in center of bone thoroughly opened. Wound healed in six months. Sixteen months from date of operation had some pain in leg, but this subsided without treatment, and patient was well 22 months later.

CASE 125. Male, 6 years. Ten weeks before entrance an attack of sharp pain in the left knee after kneeling for a long time on damp earth. Knee was bandaged and later put in plaster cast, but pain continued, keeping him awake at night. Slight fever. *Examination.*—Left knee swollen. Motions limited to 30°. Lower end of femur thickened and tender. X-ray shows periostitis lower end of femur, with several abscess cavities and sequestra. *Operation.* Much involucrum cut away and many small abscesses opened and sequestra removed. Packed. Wound healed without incident, but broke down after some months, with the discharge of a small piece of bone, after which it healed at once. Considers himself well now,—17 months later.

This case was a particularly low-grade infection.

The other case in which sequestrotomy was done was osteomyelitis of the ulna, and resection was not indicated.

CASE 153. Male, 2 years. Five weeks ago, without cause, right wrist became swollen and tender, and an abscess broke. *Examination.*—Poorly nourished child. Lower end of right ulna much thickened with the openings of two sinuses. X-ray shows much involucrum about lower half of ulna, and a large sequestrum. *Operation.*—Lower half of ulna removed easily as a sequestrum. Wound healed in six weeks. No trouble since,—one year later.

*Subperiosteal Resection.* The operation of subperiosteal resection was performed six times, twice in cases classed as chronic and four times in acute cases in which, after the first operation, the process went on to bone destruction. This operation is really only an early complete sequestrotomy, and should be done in every case, when possible, as it removes the dead bone,

which is acting as a foreign body, early, and gives the new bone a chance to form normally. It is, unfortunately, applicable only to certain bones, as those of the forearm and lower leg. It is impossible to perform it on the femur or on the flat bones, as the ilium or scapula. Cases are reported of resection of the humerus, which is possible, but even here it is necessary to wait until a sufficient amount of involucrum has formed to give the arm some stability, and the operation is, therefore, a sequestrotomy, done rather early.

The operation should be done from six to twelve weeks after the onset of the disease, depending on the bone and the age of the patient. The ideal time to do it is after the involucrum has started to form about the sequestrated shaft, but when it is only about the thickness of an egg shell. A tourniquet should always be used, and there is considerable shock following the operation. An incision is made the entire length of the dead portion of the bone, and carried down through the periosteum to the sequestrated shaft. The periosteum, with the new-formed bone attached to it, is then carefully stripped from the sequestrum. This may be accomplished easily or with considerable difficulty. The dead shaft is then removed, the periosteal tube sutured with catgut and the skin wound closed, with a small drain in one or both ends. There is usually astonishingly little sepsis, but a sinus generally persists for a long time.

Regeneration takes place in from two to twelve months, the rapidity varying greatly. The new bone is very brittle and liable to fracture after slight violence for a long time. Healing, however, takes place as usual. I have had two cases in which regeneration failed to occur, but in which a later bone-graft operation was successfully done. Why regeneration failed to take place I do not know, as one case, at least, seemed to be ideal.

Of the six cases of resection, three were of the entire shaft of a long bone, the radius twice and the fibula once, and three were partial. Of the latter, two were of the lower third of the tibia and one of the upper third of the radius. Regeneration took place promptly in all, and today all are well,—one year or more after operation. In one case (141) the epiphysis of the lower end of the radius was destroyed when first seen, and there will probably be some deformity as the ulna grows. If it becomes marked I shall destroy the epiphysis of the lower end of the ulna or resect a portion of that bone.

CASE 141. Male, 9 years. Sprained left wrist Oct. 15, 1915. The same night had acute pain in the wrist, with fever and vomiting. This continued for a week, when a surgeon was called and an operation performed, pus being found under the periosteum, and in the medulla at the lower end of the radius. X-ray at this time was negative. *Culture.*—*Staph. aureus*. Six weeks later an x-ray showed



FIG. 3. Case 141. Acute osteomyelitis of the lower end of the radius, later involving the entire shaft. Male, nine years old.

- a. X-ray taken two weeks after the first operation of drainage of the lower end of the bone. The opening into the medulla is seen, and some bone destruction, but the shaft appears normal.
- b. X-ray six weeks later. The entire shaft of the radius is destroyed and there is considerable new formed bone surrounding it. Subperiosteal resection was done at this time.
- c. X-ray six months later. The shaft has regenerated although the bone as yet does not appear normal. All wounds are healed and function is perfect. A small sequestrum was removed from the centre of the bone shortly before this plate was taken. There is some shortening of the bone as the epiphyseal cartilage has been destroyed.

destruction of the entire shaft of the radius with much involucrum, and also destruction of the epiphysis. Two months after the onset of the disease, subperiosteal resection of the entire shaft of the radius was done, the shaft being removed in two portions. Following this the patient had scarlet fever. In February, 1916, the bone had regenerated, but two sinuses persisted, and two small sequestra were removed. A second small sequestrum was removed in July, 1916, after which the wound healed. Now the bone appears fairly normal with the x-ray, and function is perfect. The epiphysis of the lower end being destroyed, the left radius is somewhat shorter than the right.

CASE 108. Male, 18 years. Eight weeks previous to admission, sprained his arm. This was thought to be a fracture and was put up in splints, but later an abscess formed, at the wrist, which was opened. This wound had been draining since. *Examination.*—Well developed man. The entire left ulna is thickened. X-ray shows the shaft entirely sequestered and surrounded by much involucrum. *Operation.*—Subperiosteal resection of the lower half of the radius. Practically a sequestrotomy only of the upper half of the bone was done, as the involucrum was very thick. Regeneration was prompt, and no secondary operation was necessary. Twenty-six months later the man reported by letter that his arm was well and that he was working at his trade,—a blacksmith.

CASE 109. Male, 16 years. Injured left knee playing football three months ago. Ten days later an abscess formed to the outer side of the knee, and was opened by his physician. Since then four other abscesses have been opened below the first. *Examination.*—Left fibula much thickened with the openings of four sinuses between the knee and ankle. X-ray shows destruction of the entire fibula with considerable involucrum. *Operation.*—Entire shaft of fibula removed in several pieces. (There was so much involucrum in this case it might more properly be classed as a sequestrotomy.) It was neces-

sary to remove several small sequestra later. The bone has now regenerated, but is somewhat irregular at the upper end. The boy is well and function perfect, two years later.

There were three cases of partial resection (Cases 118, 141, 145).

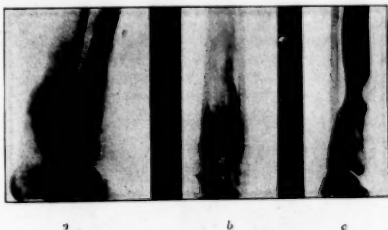


FIG. 2. Case 118. Osteomyelitis lower third of tibia. Male 13 years old.

- a. X-ray taken four weeks after the first operation of trephining. The openings made into the medulla can be seen. There is considerable bone destruction and new bone formation.
- b. X-ray taken about two months after the operation of subperiosteal resection. New bone is seen forming and the epiphysis seems to be involved.
- c. X-ray taken two years later. Clinically the result is nearly perfect. The boy walks without a limp, and there is only one-fourth inch shortening. In the x-ray the bone is irregular and there are several small cavities in the lower end.

CASE 118. Male, 13 years. Three days ago right ankle became painful and swollen, and had chills and fever. The pain has increased and has vomited several times. *Examination.*—Right ankle and lower quarter of tibia swollen, red and very tender. Motions of joint not painful. Temperature, 102.5; pulse, 136; white count, 22,800; x-ray, negative. *Operation.*—Pus found in soft parts and in the medulla of the lower end of the tibia. Five burr openings made. *Culture.*—Staph. aureus. Eight weeks later subperiosteal resection of the lower third of the tibia was performed. The bone regenerated fairly quickly, but it was necessary to remove several small sequestra later. At the end of one year the wound was solid and the patient walked without a limp, although there was some limitation of the motions of the ankle joint. Two years later reports that he is perfectly well.



FIG. 4. Case 145. Female, 12 years old. Acute osteomyelitis of the lower end of the tibia.

- a. Condition of the bone about four weeks after the first operation of trephining. The openings into the medulla, made for drainage, are seen. There is periostitis and new bone formation, with destruction of the old shaft.
- b. X-ray five months after resection. The defect has filled in but the bone is not yet normal. There is a small sequestrum at the lower end of the normal shaft which was easily removed, and this was followed by prompt healing of the sinus. There was no shortening, and the weight could be borne on the leg.

CASE 145. Female, 12 years. Six weeks ago, after exposure, right ankle became painful and swollen. Was feverish and vomited. Has been in bed most of the time since. *Examination*.—Lower third of right tibia swollen, red and tender. X-ray shows considerable involucrum and destruction of the bone of the lower third of the tibia. Temperature, 99.8; white count, 12,000. *Operation*.—Large abscess in the soft parts opened, and pus also found in the medulla. Two weeks later, subperiosteal resection of the lower quarter of the tibia. A small sequestrum was discharged from the wound three months later. The bone regenerated rapidly, and the patient was walking in six months.

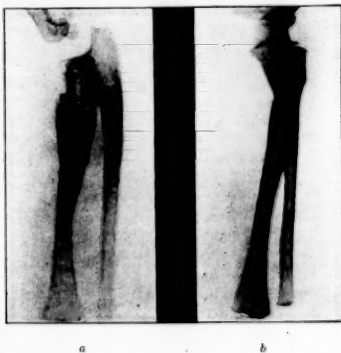


FIG. 5. Case 149. Female 2 years. Acute osteomyelitis of six weeks' duration.  
a. Showing condition of the bone shortly after entrance to the hospital. The upper third of the radius was resected.  
b. X-ray taken six months after resection. The bone has regenerated, but there is still some periosteal thickening. The wound is solid, and the motions of the elbow perfect.

CASE 149. Female, 2 years. Middle ear two months ago. For past month has not used right arm and for past ten days the elbow has been swollen and tender. Child is fretful and sleeps poorly. *Examination*.—Right elbow held stiff and motions painful. Red, tender and swollen. X-ray shows osteomyelitis of upper third of ulna, with bone destruction and considerable involucrum. *Operation*.—Abscess in the soft parts opened and pus also found in the medulla. *Culture*.—Streptococcus. Two weeks later, resection of the upper third of the ulna. The convalescence was stormy and the child was very sick with pneumonia. The wound healed in three months. Six months later the wound was solid and the motions of the elbow normal.

#### SUMMARY.

As a result of a study of these cases, I see no reason to change the conclusions already drawn and previously cited. Acute osteomyelitis varies greatly in severity, from a mild local infection of a single bone to an overwhelming septicaemia, with infection of many bones, and death in a few days, but the milder forms are more common than the severe.

Cases seen within a few weeks from the date of onset should be cured by operation except in exceptional instances. One operation is usually

insufficient, and two or more are often necessary. At the first operation, however, some idea of the prognosis can be obtained and a more or less definite plan for further operations determined upon.

Osteomyelitis of the ilium or femur is difficult to treat, and the hope of a cure is much less than when other bones, as those of the forearm or leg, are diseased. Multiple osteomyelitis is exceptionally difficult to cure, but each bone should be treated as if it alone were the only one affected. Infinite pains and patience are necessary to cure any case, and they should be followed up very carefully, especially during the first year, and x-rays taken at frequent intervals.

### PERSONAL EXPERIENCE WITH CARCINOMA OF CERVIX.\*

BY LINCOLN DAVIS, M.D., BOSTON.

I FEEL some hesitancy in placing before this Society my rather limited experience with a subject which is considered strictly gynecological. The general hospital with which I have the great privilege of being connected has adhered to the old-fashioned principle of retaining the pelvic surgery of women under the wing of the general surgical service. At the present moment there seems to be a distinct tendency for the pendulum to swing back to this position. It is generally recognized that pelvic surgery cannot be divorced from abdominal surgery. The two are too closely merged and interrelated. The leading gynecologists in the land are, and have been for some time, successfully attacking lesions above the pelvis; first the appendix, then the ureter and kidney; later the gall-bladder, stomach and intestines, and now even the breast and thyroid gland. It is a trite but truthful saying that whoever opens the abdominal cavity should be capable of coping with any complicating condition which may be found therein. Who can say that a man capable of performing the radical removal of the carcinomatous uterus shall not operate upon the stomach or gall-bladder, or that the skill requisite to the closure of a vesico-vaginal fistula shall not be applied to the closure of an intestinal fistula? Gynecology has expanded to embrace practically the entire pelvic and abdominal surgery of women. But this is an inconsistent limitation, for the removal of the kidney, appendix or gall-bladder, or operations on the alimentary tract do not present any sexual variations. If such a liberal interpretation be granted to the field of gynecology, then in fairness to the general surgeon it must also be conceded that a man capable of performing a plastic repair of a cleft palate, a gastro-enterostomy, or intestinal suture, is likewise capable of the plastic repair

\* Read before the Obstetrical Society of Boston, Dec. 26, 1916.

of lacerations of the genital tract; or that one able to perform the radical removal of cancer of the rectum is well equipped to attack the same disease in the uterus. The disrepute of the plastic perineal repair work of the general surgeon of the past was referable more to lack of interest than to lack of skill. Even in my day as an interne, it was the common practice to relegate such cases to the house officer, with results that might well be expected. At the present time, with a truer recognition of the relative degrees of skill and judgment required on the part of the operator, the internes and house surgeons are given herniae and interval appendicectomies, and only rarely, after sufficient apprenticeship, plastic repair work on the genital tract. The field of general surgery, with its great advance in many lines, is manifestly too broad for the mastery of all its diverse branches by any one man. There is recognition of this individual limitation at the Massachusetts General Hospital, and apart from the establishment of separate Orthopedic and Genito-Urinary departments, the general surgical service, through its Executive Committee, makes individual assignments of certain subjects which present peculiar problems or require special skill, study or interest for their proper investigation and treatment. In this way it is expected that every member of the Staff may be a general surgeon capable of performing the routine surgery of a general service, but with opportunity and incentive to follow out some special line of work which engages his particular interest or calls forth his particular capabilities.

This plan has undoubted merit and is capable of great development. It allows an individual opportunity to specialize in a narrow field but with a viewpoint broadened by contact with the wide expanse of general surgery.

I have held the assignment of cases of carcinoma of the uterus at the Massachusetts General Hospital since August, 1915. During a portion of this time the assignment has been shared with another member of the Staff. Twenty-six cases have come under my personal charge under the assignment, and my total experience with carcinoma of the cervix, including private cases and hospital cases before the assignment, consists of 51 cases. In every single one of these fifty-one cases the disease was clinically unmistakable and in all but three or four the ulceration of the cervix was considerably advanced, in the majority hopelessly advanced. In every case the diagnosis has been confirmed by microscopic examination. It is a striking fact that no cases of unsuspected or incipient carcinoma of the cervix have been revealed by microscopic examination. At the present time, a systematic search is being carried on in the Out-Patient Department for these cases, and all precancerous lesions of the cervix, such as long-standing erosions and ulcerations of lacerated cervixes, leucoplakia, etc., are being sub-

jected to microscopic study. Of the total of 10,000 new patients among women admitted to the Out-Patient Department during the year 1915, cancer of the cervix was found in 9, less than one in a thousand. It is presumable that the disease existed in a precancerous or unsuspected form in many more than this number, and it is to be our earnest effort in the future to discover them, if possible. At the present time I am completely in the dark as to the clinical appearances of the precancerous cervix. It is only by the collection of data as to the clinical appearance and microscopic structure of large numbers of lacerated, eroded, and ulcerated cervixes that facts may be obtained which may shed some light on this obscure subject.

Out of the total of 51 cases treated, 33 were subjected to some form of palliative operation. These palliative operations consisted for the most part of curettage and cauterization. The Percy technic has been carried out completely in eight cases only, that is, thorough slow cooking of the growth, with ligation of the internal iliac and ovarian vessels, the hand of an assistant guiding the direction of the heating iron from within the peritoneal cavity. In four other cases the Percy technic was employed as far as the use of the heating iron was concerned, but without ligation of the internal iliacs.

It is only fair to the Percy method to state that in all but one case in which it was employed the disease seemed hopelessly advanced, certainly too much so to permit of radical removal.

The one favorable case in which a radical hysterectomy might have been done, but in which as a matter of fact the Percy operation was adopted, has shown extension of the disease within six months and the patient is now dying, one year from date of operation.

There have been three cases in which the Percy method was used in which very distressing urinary fistulae developed. There was one case of moderate secondary hemorrhage, controlled by packing.

There was but one operative fatality among the 33 palliative operations. This was the case of a severely prostrated and exsanguinated woman, who, after excision and cauterization of a fungating mass protruding from the cervix, died of bronchopneumonia.

As to end results, curettage and cauterization have given a short period of immunity from hemorrhage and foul discharge of from six weeks to six months. There has been no noticeable lessening of pain.

Of the 12 cases in which the Percy technic was carried out in whole or in part, four have not been heard from since. Two have died of the disease, respectively, three and five months after operation. One patient is at present dying of the disease one year after operation. Three patients have been heard from three to eight months after operation with unmistakable evidence of disease in the pelvis; one of these, how-



ever, seems to have been greatly relieved symptomatically. One patient reports by letter six weeks after operation as feeling relieved.

One patient, six months after operation, although suffering from urinary fistula, presents no evidence of malignancy.

All of these surviving cases, and particularly the last, must be followed up rigorously to permit of definite conclusions.

From this brief and inconclusive experience I must own that I feel little enthusiasm for the Percy operation. Whether from faulty technique or lack of experience, I have found the control of the requisite amount of heat most difficult of attainment. Any procedure adopted as a mere palliation, which results in the distressing sequela of urinary leakage in 25 per cent. of the cases, must be cautiously considered. If the method were really curative, one could more cheerfully recommend such a risk.

The rationale of the Percy operation is based on the assumption, to quote the author himself, "that cancer is destroyed when the temperature in the mass is raised to 50-55.5 C. (122-131 F.), while the vitality of normal tissues is not changed until the temperature exceeds 55 to 60 C. (131-140 F.). The basic idea, then, of this treatment—and this cannot be too often emphasized—is not cauterization, but the production and dissemination of heat in the gross primary mass of cancer." The experimental evidence upon which Percy's attractive theory is based is the work of Haaland, Clowes, Loeb, Baeslack, Jensen, and Lambert, and consists of experiments made with the transplantable tumors of mice, carcinomata and sarcomata, exposed to varying degrees of heat *in vitro*. Suggestive as these laboratory findings may be, actual conditions found in cases of cancer of the uterus in the human being are far different. The only proof of a clinical problem is actual experience accurately recorded. The few cases on record of post-mortem examination after the employment of Percy's technic do not seem to bear out the author's theory of the selective action of heat upon the carcinoma cells with immunity of the neighboring connective tissue cells.

Dr. Percy has not as yet published his results. In 1914 he stated that he believed "that a large number of cases, if not practically hopeless when first presenting themselves for treatment, will give approximately 50 per cent. remaining free from recurrence over five years." We must await Dr. Percy's statistical report of results before passing judgment on the method. The theory upon which it is based is ingenious and attractive. His electric heating iron or cautery is certainly a most excellent and useful instrument, far better than any similar one ever before offered. The advantages of an assistant's hand in the open abdomen are also manifest. That the method has undoubted value as a palliative measure I think there can be no doubt. That it is of value as a curative agent, except

perhaps in very early cases, remains to be proved. That it is capable of doing much damage and setting up most distressing sequelae is unquestioned.

The method is certainly worthy of thorough test, but should be used with care and discretion and with due cognizance of the dangers incident to striving to reach and cure far outlying areas of disease with a destructive heat which at best is but crudely and uncertainly controlled.

During the last year a considerable number of the apparently hopeless cases have been referred to the Huntington Hospital for treatment with radium. A few cases have been sent there without preliminary palliative operations. I am unable at present to state what the results have been in these cases.

Nineteen cases have been subjected to abdominal hysterectomy, of which 4 were done in private practice, the others at the clinic. Not all were favorable cases by any means, in many the disease was far advanced with extension into the parametrium and vagina and fixation in the pelvis. In one case the disease had invaded the bladder and rectum, necessitating resection of a portion of both these organs. The operation done was radical in all but one case, in that it involved dissection of ureters and ablation of as much parametrium and cuff of vaginal wall as possible. The one exception was a case in which the disease was incipient, and a total abdominal hysterectomy was performed without dissection of the ureters or removal of parametrium. I hasten to state that I believe this to have been a mistake. It is in the favorable cases that we should do our most radical operations. If one believes in the radical operation at all, it is only right to let the favorable cases have the greater chance of cure which it may give. In only one case was a systematic dissection of the pelvic glands, as advocated by Wertheim, attempted. In this case a chain of carcinomatous glands were dissected from along the iliac vessels. This patient had one year of comparatively good health but has had severe abdominal and sacral pain for the last six months, and now at the end of the second year presents a definite recurrent growth in the abdomen.

There have been two operative fatalities, in both the result of shock and hemorrhage, giving an immediate mortality of 10.5 per cent.

The first two cases operated upon are living and well, respectively 6 and 5 years after operation. Both have been recently examined personally; there is no trace of the disease, and both are in blooming health. One other case has been examined 1 year and 1 month after operation without sign of recurrence. Three patients are known to be living from 1 to 2 years after operation but have not been examined. Two cases are known to have died of the disease respectively 6 months and 1 year after operation. In one case already mentioned there is marked recurrence 2 years after operation. Eight pa-

tients have been operated on within the year and no data as to their present condition has been as yet received.

The radical abdominal operation in my hands has not been without distressing sequelae, but such conditions can be endured with a greater degree of equanimity if there is offered a reasonable prospect of cure of the disease. There have been no less than 6 cases of urinary fistula (31%). In one of these cases there was a rectal fistula as well; this was a case in which bladder and rectum were involved in the disease and in which resection of a portion of both these organs was unwisely attempted. In the five other cases urinary fistulae resulted late, 7 to 10 days after operation, and were not due to any actual opening of the urinary tract at the time of operation, but were probably the result of sloughing of traumatized tissue. In one case the fistula was successfully closed at subsequent operation. In one case, and I think also in one other, the fistula has closed spontaneously. In another case an attempt will be made later to close the fistula by operation. One cause of the high percentage of fistulae is undoubtedly attributable to bad technic in placing a gauze vaginal drain in contact with the raw surface of the bladder and ureters. In the most recent cases a vaginal cigarette drain without protruding gauze has been used, which it is hoped and expected may result in lessening this serious complication.

In conclusion I wish to state that it is my firm conviction that the problem of the cure of cancer of the cervix in no wise differs from the problem offered by the same disease in other organs of the body, and that early and radical removal by the knife not only gives results which compare favorably with those obtained in other organs, but that for the present, at least, it is the most successful of all known methods.

## INTESTINAL VENOUS STASIS: DIFFUSION OF BACTERIA AND OTHER COLLOIDS.\*

By FENTON B. TURCK, M.D., NEW YORK CITY.

OUR ideas of medicine have been largely founded on a morphological or static conception of the organism. Now attention is being directed more and more to the consideration of the dynamic properties of life.

Synthetic chemistry and the more recent studies in the science of energy, especially as applied to protoplasm and other colloids in biology, have created a new concept of both normal and abnormal conditions.

\* Read before the joint meeting of the Pediatric Section of the New York Academy of Medicine, the New York State Society, the New Jersey Pediatric Society, the Philadelphia Pediatric Society, and the New England Pediatric Society, held in Boston, Nov. 4, 1916.

A transparent colloid, as boiled starch mixture, forming a jelly-like fluid containing finely diffused particles, may pass easily through a filter, as though it were a true solution. This illustrates what we mean by a colloidal suspension. For the fluids of the body that diffuse through the tissues as through a filter have much the same properties.

The degree of permeability of the membrane (filter), itself colloidal in character, determines the rate of diffusion of the colloid suspension that filters through. The permeability of the membranes in the living organism vary under normal as well as abnormal conditions, and represents an adjustment of the colloidal particles to the pores of the filter.

Bechhold<sup>1</sup> holds that "life is inconceivable except in a colloidal system." The diffusibility of a colloidal emulsion (such as a colloidal suspension of bacteria) passing through a colloidal substance (substratum), as animal tissues, is determined by laws of physics now only partly understood.

The study of the phenomena of the passage of colloids, such as the white of egg, unchanged through animal membrane (as the mucous membrane of the intestines) is surrounded with considerable obscurity, because of the difficulty in identifying colloidal substances after filtration. In this connection Bateman's statement, "Raw white of egg causes diarrhea in dogs, cats, rabbits and men—and after several days tolerance occurs" (that is, antibodies are developed), is of interest and in line with the facts brought out by this study.

My earlier experiments demonstrated<sup>2,3</sup> that the intestinal tube is permeable to the intestinal flora. The degree of this invasion is much influenced by changes in the splanchnic circulation (as in shock), which alter the character of the intestinal wall and render it pervious to all forms of bacteria.

My more recent investigations<sup>4,5</sup> demonstrate that an emulsion of bacteria, such as the colon bacilli, injected into the intestines of the fetal animal, rapidly diffuse through membranes and tissues. By appropriate staining methods the rate of diffusion and the route by which the diffusion occurred could be studied. When bacteria are injected into the intestines of the fetus, they show the distinct routes that may be taken from any depot along the entire tube, thus the kidney or the liver is first involved according to the location of the injection into the intestinal tract. Bacteria fed to the mother may show their effect on the fetus<sup>6</sup>.

### BACTERIAL PERMEABILITY OF THE INTESTINAL WALLS.

Because of the more rapid diffusion of the bacteria in the fetal animal, the diffusion route which they take from the intestines can be advantageously studied. It has been shown that they take the same diffusion route which they have been found to follow in the adult.

In order to demonstrate the passage of the bacteria, the tissues are fixed in formalin, without alcohol, but with appropriate stains, and it may then be seen that the passage of the bacilli takes place from the intestinal tract into the intestinal wall, (1) between the epithelial cells—not into or through the cells—and between the glands, and (2) between the muscle cells of the muscular mucosa into the areolar tissue. Bacilli do not enter the blood vessels or the lymphatics, but transmigrate through the interstitial route by diffusion into the submucous tissue. Rapid bacteriolysis is seen to take place first in this submucous zone and for this reason I have called it the "Zona Transformans." Hadley, in his studies on "Coccidia in Sub-Epithelial Infections of the Intestines of Birds," has confirmed this finding. He says "By the presence of Coccidia in the sub-epithelial territory it is interesting to observe that they may be present there in large numbers and even when the adjacent epithelial layers carry but slight intercellular infection.

The following table shows the elective diffusion route and the depot of detention of the injected bacteria in the fetal animal:

TABLE I.  
INJECTED WITH 24-HOUR CULTURES OF COLON BACILLI,  
AND THE FETAL PIG INCUBATED FOR SIX HOURS.

SITE OF INJECTION.	ROUTE OF DIFFUSION.	PRINCIPAL SITE OF RETARDATION OR ARREST.
Stomach, through a tube.	Through the gastric mucosa into submucosa to the duodenum—the bile duct wall tissue to liver.	Between the liver cells; not found in the cells.
Umbilical cord.	Via interstitial tissue to liver.	Between the cells; not in the liver cells.
Jejunum and ileum.	Through the mucosa in submucosa cephalad to the pyloric region of the stomach and duodenum.	Masses of bacteria accumulate in the pyloric area.
Rectum.	Interstitial route, bladder wall and up the wall of the ureter (submucosa).	Kidney.

The histological changes at the site of retardation or arrest of the bacteria are shown by the fact that the nuclei of the cells of the parenchyma lose their staining properties to both Gram and hematoxylin stains.

This loss of nuclear staining properties produced by the *B. coli* is in strong contrast to the effect following the injection of the Gram-positive anaerobic *Bacillus capsulatus aerogenes*. The latter cause, through the *proteinas*, a digestion of cytoplasm leaving the nucleus intact.

#### FEEDING MICE AND RATS WITH AND WITHOUT BEEF EXTRACTIVES.

A determination of the relative effect of the feeding in conjunction with the feeding of *B. coli communis*.

**Method.** The meat juice was obtained by expressing the juice from raw beef. The extract-free beef was prepared from the residue after expressing the juice.

The pulp was put in boiling water and steamed under two atmospheric pressures for

one hour; the juice was then again expressed, to feed separately to the animals. The pulp that remained, the extract-free meat, was fed to the animals dry.

The animals were then fed with cultures of the colon bacilli.

In the animals receiving the extractives, it was demonstrated, on histological examination, that the organisms passed into the submucous tissue, while in the animals that received the extract-free meat no bacteria could be demonstrated in the tissues.

Experiments were also performed, using opium and cathartics, which showed that these did not favor the migration of the bacteria.

The simultaneous feeding with beef extracts or fatty acids, together with the cultures of *B. coli*, produced prompt bacteriological migration from the intestines. The injection of toxins, such as the diphtheria toxins, was also found to favor bacterial emigration from the intestines.

Another investigation which we carried had for its object the determination of the relative effects of raw meat extract, cooked meat extract and extract-free meat. One group of animals (rats) were fed on raw meat extract to which

cultures of the colon bacilli were added. A second group were fed upon extractives from cooked meat in addition to cultures of the colon bacilli. A third group were fed upon extract-free meat (pulp residue after removing the extractives).

After one month's feeding on the extractives of raw meat, together with the colon bacilli, all the animals died. The rats fed on the extract-free meat did not die but were killed at this time for comparison. There had been no marked difference in the behavior of the animals during life. The histological examination, however, showed that in all the animals fed with extractives the intestinal bacilli had migrated from the intestinal lumen into the submucous tissue. Death was evidently due to "acidosis." The histological examination showed autolysis of the tissue cells, especially in the tissues of the mucous membrane in the pyloric region and in the liver. The nuclei, as in my previous observations, showed a lack of staining properties.

TABLE II.

THE MIGRATION OF INTESTINAL BACTERIA AFTER FEEDING ANIMALS WITH B. COLI TOGETHER WITH MEAT EXTRACTS OR FATTY ACIDS.

NAMES OF ANIMALS	NUMBER USED	FEEDING B. COLI	MEAT EXTRACT	HEATED FAT	MIGRATION OF BACTERIA IN TISSUE NOT FORMED IN TISSUE
Dogs	8	+	+		6
Cats	5	+	+		4
Rabbits	10	+	+		8
Guinea pigs	12	+	+		10
Rats	10	+	+		9
Monkeys	6			+	6

The experiments with monkeys offer very decided evidence that heated fat fed to animals increases the diffusion rate of the intestinal bacteria, causes them to penetrate the intestinal wall more rapidly, and hastens a fatal termination. This phenomenon is more marked when the fatty acid content is increased.

The following protocols on six monkeys fed with heated fat are of considerable interest as none of the animals lived, on an average, more than six weeks and all showed uniform lesions associated with bacterial invasion from the intestinal tract. No bacteria were fed, but the fatty acids fed to the animals seemed to induce the migration of the intestinal flora into the tissues.

**Method.** Six monkeys were fed with small squares of bread fried in heated cottonseed oil for thirty minutes. This fried toast was given in addition to the usual daily vegetable diet.

TABLE III.

Monkey	No.	1 died in	61 days
"	2	"	57
"	3	"	42
"	4	"	31
"	5	"	28
"	6	"	38

Blood examinations were made in all these monkeys, which gave the picture of pernicious anemia, with the characteristic increase in polynuclears.

At the same time a series of control monkeys, fed in the usual way without the fried toast, remained in a normal condition.

**Post Mortem.** The tissues were pale. Peptic ulcers were found in the pyloric region. There was fatty infiltration of the tissues, demonstrated especially in the liver, together with marked congestion of the splanchnic vessels.

The histological examination showed migration of the bacteria into the submucous tissue at various levels of the intestinal canal and in various stages of bacteriolysis. Autolysis of the tissue cells, with the usual picture of "acidosis," was found in other animals where the diffusion of the bacteria was well established.

The feeding of the heated fat gives a more intense histolytic action than that produced by the feeding of bacteria or other protein alone.

The picture is the same, however, except in degree. Fatty acids in the alimentary canal increase the permeability of the intestinal wall to the intestinal bacteria and increase the resulting "acidosis," the histolysis, venous stasis and cause death in a few weeks in monkeys. D. P. Davis, *Jour. Infect. Diseases*, Nov., 1916) finds that white rats, fed at intervals of a few days with large quantities of cultures of *Sporothrix schenckii* and fat, may become infected; that the infections tend to localize in the mesentery, peritoneum, and spleen, and that the organisms appear to penetrate the normal mucosa of the intestinal tract. No lesions, active or healed, are visible in the wall of the stomach or intestines.

We have in these findings a very plausible explanation of the reason milk mixtures, high in fat content, frequently cause intestinal disturbances in infancy, and the reason for feeding fat-free milk when we are dealing with such disturbances.

#### THE RÔLE OF THE SPLANCHNIC CIRCULATION, ESPECIALLY VENOUS STASIS, IN BACTERIAL INVASION.

**Method.** In this series of experiments over 200 animals were used. In one group of these the abdomen was opened under anesthesia and fully exposed to the air until marked venous stasis and shock was produced. The animal's abdomen was then closed and after recovery bacteria were introduced into the stomach. In a second group no bacteria were given.

The following day sections of the intestines were made and subjected to microscopical examination.

**Result.** Bacterial invasion was demonstrated in most of the slides examined. The animals not fed with bacteria gave positive results as well as those that were so fed.

The effect of cold air on the exposed viscera is to increase the bacterial invasion.

Prolonged anesthesia without the abdomen being opened, where shock was evident, also increased the permeability of the intestinal wall to the intestinal bacteria.\*

#### ANTIBODY FORMATION IN THE ZONA TRANSFORMANS.

We have called attention in the earlier part of this paper to the bacteriolysis that is seen to take place as the bacteria cross the threshold of the muscular mucosa in the submucous tissue, the *zona transformans*.

The bacteria that escape immediate bacteriolysis migrate cephalad in this zone up to the pyloric region where complete bacteriolysis occurs. The localized formation of antibodies in the *zona transformans* is apparently specific. This is shown in the following protocols.

**Method.** After cleaning the surfaces of the mucosa of the duodenum, the jejunum and the

upper part of the ileum of rabbits, it was scraped from the muscle wall. The mucosa was removed so that none of the glandular elements remained. The cellular substance and the fluid were then recovered.

The blood serum from the femoral vein, mesenteric vein, the mucosa and the submucosa were now placed in separate capsules (frozen  $\text{CO}_2$ ), and placed in vacuum chambers with  $\text{H}_2\text{SO}_4$ . They were kept in refrigeration and protected until completely evaporated. The residue of each was then weighed and comparative titers made against the broth culture of the homologous cultures secured from the intestines.

The dried residue of serum and cell substance was made into a two per cent. suspension with 8 per cent. salt solution. Dilutions of 1/20, 1/50, 1/100, and 1/200 were then used. One c.c. of serum and cell substance was added to 0.5 c.c. forty-eight hour culture of autogenous *B. coli* and incubated thirty minutes. This was then injected intravenously into young rabbits. When anaphylaxis occurred within three minutes this was regarded as a positive reaction.

Slight convulsions and recovery, or death delayed from twenty-four hours to one week, were considered, for this quantitative work, negative.

DILUTIONS	MUCOSA AND SERUMOSA	SUBMUCOSA ZONA TRANS- FORMANS	MESENTERIC VEINS	FEMORAL VEINS
1/20	+	+	+	—
1/50	+	+	+	—
1/100	+	+	—	—
1/200	+	+	—	—

**Controls.** In controls there was no anaphylaxis even when double quantities of the mucous membrane sera of *B. coli* cultures were given.

On injecting submucous substance (amboceptor) without the addition of culture, no anaphylaxis occurred. If death occurred later it was invariably due to infection. On injecting submucous substance in the fresh state in large quantities, anaphylaxis and death never occurred. When death was delayed for several hours, it was usually due to the action of the "amboceptor" on the bacteria and bacterial products already in the tissues. When death was delayed for a week it was always due to infection.

#### CONGESTION OF THE SPLANCHNIC VESSELS.

The animals receiving the injection of the homologous intestinal bacteria, sensitized with an emulsion of tissue from the zona transformans, showed symptoms of acute venous dilatation of the splanchnic vessels, and this was apparently the cause of the sudden collapse and death.

To determine the effect of the anaphylactic reaction on the splanchnic vessels, the abdomen was opened and the vessels examined under a glass at the moment of the intravenous injection

of the intestinal bacteria with the submucous material. The immediate prompt dilatation of the splanchnic veins, with corresponding contraction of the arteries, was demonstrated in each animal under observation, in which collapse and death followed immediately after the injection. In those animals in which there was a delay in the collapse and death there was also retardation in the intestinal venous stasis. Sublethal doses caused proportional slight venous stasis followed by recovery.

#### HISTOLOGICAL EXAMINATION OF THE FOLLOWING PROTOCOLS.

**FIG. 1.** Dog. This dog was fed with cultures of intestinal bacteria for two months. Laparotomy was then done under ether, and the viscera exposed to the air for one and one-half hours, when the abdomen was closed. Forty-eight hours later the abdomen was opened under ether and a specimen of small intestine removed and fixed immediately.

The section shows migration of bacteria from the lumen into the intestinal wall, penetrating the basement membrane at the bottom of the glands. Bacteriolysis is seen going on just below the muscularis mucosa. There are no evidences of an inflammatory process, no leucocytic infiltration, etc., but a wholesale invasion.

**FIG. 2.** Dog. This dog was fed for three months with cultures of intestinal bacteria; marked dilatation of the stomach resulted. Laparotomy was performed under ether and the stomach was found greatly dilated. A specimen was cut from the wall of the small intestine and fixed immediately.

This section shows contracted arteries and widely dilated veins, with serious extravasations into the surrounding tissues.

**FIG. 3.** Cat. This animal was fed cultures of *B. coli* for over two months. A laparotomy was then performed under ether. In this instance the cecum was found much dilated. A specimen from the wall of the cecum was removed and fixed at once.

The section shows beginning waxy degeneration of the cytoplasm of the muscle in spite of the heavy stain employed as shown by the nuclei.

**FIG. 4.** Dog. This dog was fed with cultures of *B. coli* for two months, when a laparotomy was done under ether and the viscera exposed for two hours. After recovery from the operation, the animal was fed as before for a week. Laparotomy under ether was then repeated. The stomach was found much dilated and the muscle of the gut flabby. A specimen was cut from the small intestine and fixed at once.

(a) The section shows beginning cytotoxicity of muscle cells with hyaline degeneration. The nuclei do not take the stain well.

(b) (Higher power of the same.) A waxy appearance of the cytoplasm is evident with a fading out of the fibrillae. The nuclei show irregular outlines with breaking up of the chromaffin; muscle fasciculi are seen partly separated.

These experiments and protocols have been selected from a large number of similar ones as affording an explanation of the etiology of some of the intestinal disturbances of infancy and



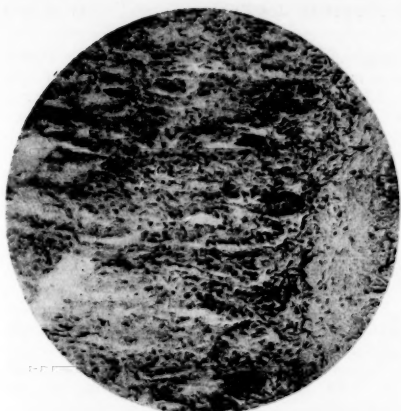


FIG. 1.

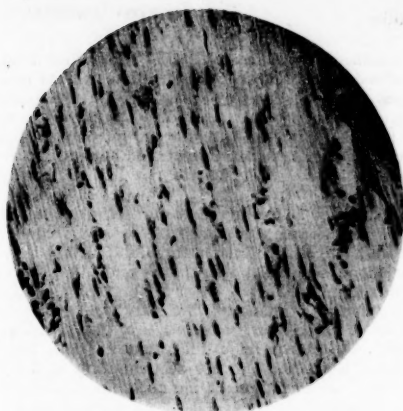


FIG. 4 a.



FIG. 2.

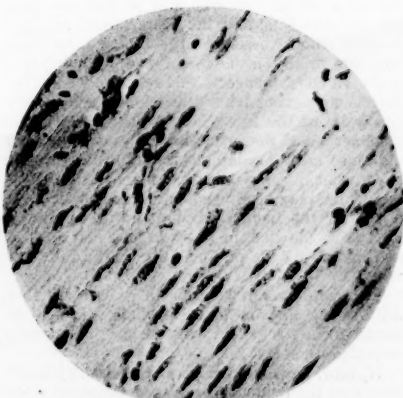


FIG. 5 b. Same as Fig. 4, higher power.

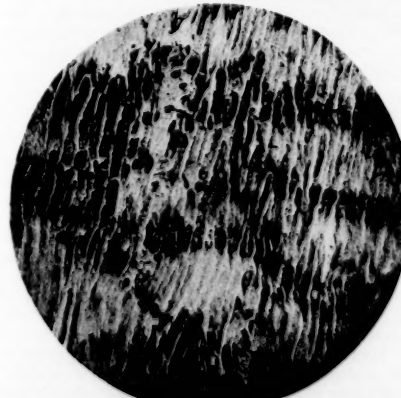


FIG. 3.



FIG. 6. Showing entire process of diffusion through intestinal wall.

childhood as well as of those of adult life. They afford an explanation of some of the effects that have been obtained by some forms of treatment which we have been accustomed to employ, and they also afford a basis for the introduction of certain factors into the treatment of these conditions, which have hitherto not been generally applied.

We have as etiological factors in disturbances of the digestive tract stasis induced by frequent feeding, causing precipitation and delayed digestion, fractional digestion and the accumulation of fatty acids. We have also the physiological changes which are not due to a lack of oxygen or increased  $\text{CO}_2$  but to acidosis. These factors just mentioned, stasis, fractional digestion, and the accumulation of fatty acids, lead to fatigue of the muscle cells and the asphyxiation of these cells.\* As a result we get an atony of the muscle wall, permeability and diffusion of the bacteria and of the fractional protein products, and the bacteriolysis and proteolysis which these undergo in the zona transformans finally leads to an anaphylactic reaction. In consequence of this reaction we see further venous stasis from dilatation and fatigue of the walls of the intestines, with a simultaneous contraction of the arteries. Thus a vicious circle more or less complete is established and we have what is clinically designated "acidosis," and which may be either acute or chronic.

One of the factors associated with acidosis is the loss of the alkaline bases in lowering the tone and increasing the permeability of the intestinal tract.

The symptoms of acidosis in its chronic form are wasting, anemia, marasmus, etc.; those of the acute form are shock, distention, prostration, convulsions, etc.

If, now, our explanation of the etiology is correct, and the evidence presented seems very conclusive, then our aims in the treatment of these conditions must be: 1. To reduce fatigue of the hollow muscle. 2. Prevent fatty acid intoxication. 3. Prevent intestinal retention. 4. Prevent absorption of intestinal flora. 5. Correct acidosis. 6. Reduce splanchnic venous stasis. 7. Increase immunity. 8. Maintain nourishment."

The general measures directed to the attainment of these objects are as follows:

First establish regular *feeding periods* to conform to the curve of muscle work and relaxation.

Provide food rich in the salts of calcium, magnesium, potassium and sodium, to replace the lost bases incident to the acidosis, *e. g.*, vegetables should be steamed for several hours rather than boiled, so that the salts are retained and are available for easy digestion. These steamed vegetables should be passed through a wire sieve and made into a purée.

*Reduce the intake of fat* to minimum requirements. Prohibit heated fat and guard against stale fat, that is, fats that have begun to be de-

composed by bacteria into fatty acids. (Olive oil is useful in the recuperative stage.)

*Allow no extractives* in the food, no soups, bouillon, etc. Protein without extractives is completely digestible in the upper part of the digestive tract and there are then no extractives to render the intestinal contents a culture medium and induce bacterial invasion and a possibly resulting acidosis.

Older children may be given extract-free meat.

For a time the total protein intake may be reduced. (Kurt Blunhorn, *Monatsch. Kinderk.*, Vol. 13, No. 7.)

Baths, both foot baths and sitz baths, containing salt with soda, beginning at  $105^\circ\text{F}$ . and gradually raised to  $110^\circ\text{F}$ ., are also indicated.

Medication depends upon whether we are dealing with an acidosis in the chronic or the acute form.

To prevent the passage of the bacteria from the intestinal tract, demulcent Irish moss, liquid vaseline and fine bran have been found effective.

*Treatment of Severe Acute Cases.* This consists in (1) gastric lavage, daily, hourly, or continuously, as the severity of the symptoms indicate. (2) Colonic lavage.

In this connection it is well to recall that Weeks has shown, after watching the routine use of the Murphy drip after operations in various hospitals, that half of the distress complained of by the patients he thought was due to retention in the bowel of gas or too much fluid. This is especially so in little children. Therefore, the use of the double recurrent tube with continuous lavage is to be preferred. (Turek, "Treatment Abdominal Viscera through Colon," *Jour. A. M. A.*, Oct. 7, 1899, and May 5, 1900.) The outer tube is introduced into a bottle, and the inlet reservoir connected with the inlet tube raised a little above the patient.

(3) Lavage with weak silver nitrate, followed by infusion of sodium bicarbonate solution. In extreme cases one may find it necessary to resort to a transfusion of autoserum. (4) Demulcents. (5) Venesection, followed by infusion of sodium bicarbonate solution. (6) Continuous bath.

#### THE TREATMENT OF MODERATELY SEVERE AND CHRONIC CASES.

In these, as in the acute cases, gastric lavage and colonic lavage hold an important place. The colonic lavage, however, should in these cases be given with the gentle pneumatic gymnastics method. The alkaline demulcents have also a place in these cases. These chronic cases are the ones in which, according to my experience, one finds an appropriate field for the employment of autogenous vaccines, made according to the method which I will describe.

Many children have two microorganisms present, often the *B. coli* and either a streptococcus or a staphylococcus in symbiosis. These are frequently found in the urine, having passed

from the intestines, migrated through the tissues and escaped by way of the kidney.

#### METHOD OF PREPARING VACCINES.

- (1) Make cultures from feces. Isolate *B. coli* and other cocci usually in symbiosis.
- (2) Centrifuge the urine. Isolate *B. coli* and cocci (usually in symbiosis).
- (3) Centrifuge the stomach contents, obtained from morning fasting stomach. (Avoid clumps of mucus that appear to come from the mouth.) Isolate *B. coli* and cocci usually in symbiosis.
- (4) Combine these cultures. Secure the patient's serum. Spread over an agar slant and freely sow the combined or mixed cultures. Cultivate for 36 to 48 hours. Kill the culture in triresol, not by heat.
- (5) Sensitize the culture with the patient's serum. Prove the culture dead by incubation.
- (6) Count. Put in ampules in graduated, increasing doses, from 100,000,000 to 1,000,000,000.

These microorganisms, secured from the urine and stomach contents, have thus been activated by the patient's own serum or secretions and have acquired certain specific antibodies which render them more valuable for vaccine purposes. In addition, growing the microorganisms cultivated in the patient's own serum *in vitro* permits an additional absorption to take place under conditions more nearly approaching those *in vivo*. Finally, by incubating the killed bacteria with the patient's serum, additional antibodies are taken up, making a most perfect vaccine, and one with a most potent effect.

#### THE PREPARATION OF MEAT, BEEF, MUTTON AND CHICKEN.

*Preparation of stock.* Meat is chopped up or left ground in the meat grinder, and the juice is pressed out. Or, again, it may be left in cold water over night and then squeezed out. The juice is then thrown away and the meat is placed in a steamer with a little cold water and steamed for two or three hours. The juice is then discarded. The pulp remaining represents the nutritive part of the meat with the unnecessary and poisonous part removed.

This extract-free meat may then be made palatable in a variety of ways:

1. Milk or cream may be added, with a little flour, heated, seasoned, and spread on toast.
2. It may be made into small patties, dipped in egg, and broiled.
3. A mixture of half bread crumbs and half meat may be flavored with bay leaf or curry, bound together with milk and egg, and baked in the oven as a veal loaf; it may be eaten hot or cold.

The extract-free meat may be mixed with a little curry, and milk added; it may then be placed in a porcelain dish and surrounded with

a border of rice, covered with beaten white of egg, and then quickly heated in the oven.

5. The meat may be made into cutlets and heated with a little butter in a pan, but not fried in the ordinary way.

With the exercise of a little ingenuity many other ways will suggest themselves by which meat of this kind may be made palatable and attractive.

A review of my clinical cases covering a period of fifteen years, which have been treated with autogenous vaccines, shows a higher percentage of permanent good results than the cases treated previously to that time without the vaccines. The ages of the patients to whom this method of treatment has been applied have ranged all the way from infancy to eighty years. I do not claim that the vaccines have been the only factor in securing unusually good results, but that the vaccines in combination with the other methods, the *combined system*, warrants distinctly favorable conclusions on the basis of a careful analysis of the data presented by 158 cases in which complete data could be collected, and a much larger number in which the data were more or less incomplete. While my conclusions are based on purely empirical results, as Gay remarks (*Jour. A. M. A.*, Oct. 28, 1916, p. 1263), "Purely statistical methods of investigation must in more alert minds yield to comparative studies." I have attempted to place the experimental facts before you and they seem to have a direct relation to our clinical experience. It seems to me that this experimental data, bearing on the etiology of intestinal disturbances, should possess a special interest to the pediatrician, not only on account of the importance of alimentary conditions in infancy and childhood, but because a large percentage of chronic intestinal diseases in the adult have their inception in the faulty conditions of the alimentary tract in infancy and childhood:

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- <sup>3</sup> Turck: Sect. on Experimental Pathology and Therapeutics. Berlin, 1910.
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- <sup>7</sup> Turck: British Medical Journal, April 20, 1907.
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## Reports of Societies.

### NEW ENGLAND PEDIATRIC SOCIETY.

A combined meeting of the Pediatric Section of the New York Academy of Medicine, the New York State Society, the New Jersey Pediatric Society, the Philadelphia Pediatric Society and the New England Pediatric Society was held in Boston on Saturday, November 4, 1916.

The program for the day was as follows:

- 8.45 A.M. Assemble at the Harvard Club.  
 9-9.30 Massachusetts General Hospital, Problems in Metabolism—Dr. Fritz B. Talbot.  
 10-10.30 Boston Dispensary, Clinical Cases, with special reference to Feeding—Dr. Maynard Ladd.  
 11-11.30 The New England Home for Little Wanderers, The Problem of the Delicate Child—Dr. W. R. P. Emerson.  
 11.45-12.30 Children's Hospital, Clinic by Dr. John Lovett Morse.  
 12.30-1.30 The Infants' Hospital, Intraspinal Injections—Drs. Dunn, Howell, Grover.  
 The Baby Hygiene Association—Dr. J. Herbert Young.  
 1.30 Luncheon at the Harvard Medical School.  
 2.00 Massachusetts School for Feeble-minded at Waltham, Clinic by Dr. Walter E. Fernald, Superintendent of the School.  
 6.30 Dinner at the Harvard Club.  
 8.15 Meeting in John Ware Hall, Boston Medical Library.

The following papers were read:

1. Medico-Educational Problems in the Treatment of Atypical Children—G. Hudson Makuen, M.D., Philadelphia, Pa.
2. Intestinal Venous Stasis: Diffusion of Bacteria and other Colloids—Fenton B. Turk, M.D., New York.\*
3. The Epidemiology of Bacillary Dysentery—W. G. Smillie, M.D., Boston.

#### EPIDEMIOLOGY OF BACILLARY DYSENTERY.

(Abstract.)

DR. WILSON G. SMILLIE, Boston: The cause of bacillary dysentery is well known, and its treatment has received careful study, but the mode of transmission of the disease has not excited much interest. The Floating Hospital of Boston studied its cases of bacillary dysentery during the summer of 1916 from the point of view of the origin of each case, in order to find nests of infection in the city, and to discover the important factors in the transmission of the disease.

The cases were studied (1) from the community point of view, a record being kept of temperature, humidity, and other factors affecting all individuals. (2) Neighborhood conditions were studied by means of daily records of all reported cases of the disease, in order to expose nests of infection in various parts of the city. (3) The family condi-

tions of each case were studied by means of a Housing Score Card, similar to the familiar dairy or market scorecard. (4) Finally, the activities of each individual case for a period of 10 days before symptoms developed were investigated, in order to discover if possible the source of infection.

No relation was apparent between the case incidence of the disease and high temperature and humidity. The incidence seemed to follow the fly curve more closely than it did the temperature curve.

Several nests of infection were discovered in various parts of the city, notably in South Boston. It is concluded that unsanitary conditions may exist without dysentery, but poor housing conditions are a fertile soil for the development of the disease. The disease was more common among the children of American and first generation parents than among foreign parents, probably because the foreigners more frequently nurse their infants.

The source of infection of seventy-five cases was studied. The etiology of these cases was as follows:

Contact with an acute case .....	21
Contact with a carrier .....	2
Contact with a house case .....	4
Condensed milk epidemic .....	15
Ice cream .....	9
Flies .....	6
Milk .....	1
Water .....	1
Fruit .....	1
Unknown .....	15

Of the 21 cases due to contact with an acute case, eight were adults; the remainder were older brothers and sisters in the family. As a rule, the course of the disease in the older children was mild, and none of these cases died. In several instances, however, a mild adult case transmitted the disease to an infant of the family with rapidly fatal results.

There was one epidemic of dysentery which seemed to be due to the use of a cheap brand of condensed milk. Fifteen children were infected between the middle of July and the middle of August. The cases were from all parts of the city, some in isolated communities, and had but one factor in common: the use of S brand of condensed milk. In most instances, it was the only food the child had.

Ice cream cones of the cheap "penny horn" type were responsible for 9 cases of bacillary dysentery. These cases were in older children, and the epidemiology is less definite, but in each case the ice cream factor was very suggestive. In one instance, dysentery bacilli were isolated from a sample of ice cream that had been the source of infection of at least two cases of the disease.

A Shiga epidemic of dysentery was traced from one community to another and gave the best single example of the mode of introduction and transmission of disease in the community. The disease began with an ice cream infection, was transmitted by contact to a dairyman, thence through milk to a fresh-air summer camp. Twenty-two children were infected by the milk and were all sent home. One of these children came to her home in an unsanitary Boston suburb and transmitted the disease to her brothers and sisters by contact, and to

\* See JOURNAL, page 663.

the neighbors by means of flies and an intermediary carrier.

It was concluded that bacillary dysentery is frequently spread by means of contact with an acute case, or a carrier; and by means of food, as milk, condensed milk and ice cream; by water, and by flies. The sporadic type of summer dysentery of infants is often transmitted to older children and adults, but, as a general rule, the older the child, the milder the disease.

#### DISCUSSION.

DR. BOWDITCH: I have not much to add to Dr. Smillie's report, except to say that as he has begun the work, so I hope that he will continue it. He has been able to accomplish that which another person, not initiated, would be unable to do without much stumbling. The handling of the parents was a delicate task, to say the least. Through the co-operation and the help of Mr. Norbury, our bacteriologist, Dr. Smillie was materially assisted in drawing his conclusions, and presenting these interesting facts.

I thought you might be interested, in connection with Dr. Smillie's paper, to hear what has been the result of our bacteriological findings during the past three summers. We are especially interested, as you know, in the bacteriological side of these dysenteries. I will therefore give a short résumé.

In 1914 there were 79 cases; in 68% the Flexner organism was discovered. In 1915, 75 cases, 86% of which gave the Flexner infection. In 1916, 64 cases. Dr. Smillie has a few to add on the outside which did not come to the wards. Of the 64 cases that were in our wards, 88% showed the Flexner infection. In 51, or about three-fourths of these cases, the bacteria were recovered in the stools. The others were recovered at autopsy, and a certain few were diagnosed through the finding of agglutinins. At the same time that we carried on the investigation we studied the occurrence of the *B. welchii* to see what influence, if any, it had. During these three years we discovered that the *B. welchii* did not apparently play an important part.

In 1914 a close bacterial investigation was carried out, and the *B. welchii* series was studied in infectious diarrheas, as well as in indigestion, malnutrition and normal cases. Six to 11% reactions were found among the infectious diarrheas, 27% in the digestive cases, 28% in the malnutrition cases, and 38% in the normal cases. The infectious diarrhea cases were studied carefully and thoroughly. The other cases, of indigestion, etc., were picked at random. Our feeling about this problem has changed in 29 cases. We now feel that the Flexner organism is the main etiological factor in these cases of dysentery; that the gas bacillus is a complicating organism and probably not the etiological factor in this disease.

The treatment that we carried out on the boat this year was the following. After an initial cathartic, unless contraindicated, we fed our cases (clinical picture of dysentery) on water for the first twelve hours, then fed them on high carbohydrates, provided they did not react to the gas bacillus infection.

If the gas bacillus infection did occur, we gave the child buttermilk and cut down on the carbohydrates. The results were uniformly gratifying. Out of the 64 cases we lost a very small proportion—the exact per cent. I do not know at present.

### Workingmen's Compensation.

#### SPECIFIC PAYMENTS UNDER THE WORKINGMEN'S COMPENSATION ACT.\*

##### DUTY OF PHYSICIAN IN GIVING NOTICE.

By FRANCIS D. DONOGHUE, M.D., BOSTON,

*Medical Adviser of the Massachusetts Industrial Accident Board.*

THE Workingmen's Compensation Act will well repay careful reading and study.

As the accidents under the compensation act occur in every nook and corner of the Commonwealth, it is necessary for every doctor to understand the operations of the law that affect his interest or affect the interest of those who may come under his direct control or care.

It is apparent that all physicians do not understand some of the very important parts of the Act. First, the portion of the Act that governs the payment of specific compensation for specific injuries independent of the disability that results from the accident itself, and the second portion, the duty of giving notice that the right of the man or the physician may be safeguarded.

An important part of the law, which should be given careful consideration by the medical profession because it has to do with the rights of the man for specific compensation, reads as follows:

(Section II, Part II):

"In case of the following specified injuries, the amounts hereinafter named shall be paid in addition to all other compensation:

"(a) For the loss by severance of both hands at or above the wrist, or both feet at or above the ankle, or the loss of one hand and one foot, or the reduction to one-tenth of normal vision in both eyes with glasses, sixty-six and two-thirds per cent. of the average weekly wages of the injured person, but not more than ten dollars nor less than four dollars a week, for a period of one hundred weeks.

"(b) For the loss by severance of either hand, at or above the wrist, of either foot at or above the ankle, or the reduction to one-tenth of normal vision in either eye with glasses, sixty-six and two-thirds per cent. of the average weekly wages of the injured person, for each hand or foot so severed, but not more than ten dollars nor less than four dollars a week, for a period of fifty weeks.

"(c) For the loss by severance at or above the second joint of two or more fingers, including thumbs of the same hand, or of two or more toes of the same foot, sixty-six and two-thirds per cent. of the average weekly wages of the injured person, but not more than ten dollars nor less than four dollars a week, for a period of twenty-five weeks for each hand or foot so injured.

"(d) For the loss by severance of at least one phalanx of a finger, thumb, or toe, sixty-six and two-thirds per cent. of the average weekly wages of the injured person, but not more than ten dollars nor less than four dollars a week, for a period of twelve weeks for each hand or foot so injured.

"(e) The additional amounts provided for in this section in case of the loss of a hand, foot, thumb, finger, toe, or phalanx, shall also be paid

\* Abstract of remarks at the Annual Dinner of Court Physicians, M. C. O. F., Feb. 13, 1917.



for the number of weeks above specified, in case the injury is such that the hand, foot, thumb, finger, toe or phalange is not lost, but so injured as to be permanently incapable of use."

The wording in the section providing for additional compensation for specific injuries went into effect on October 1, 1914, and the last paragraph is most important, where it provides that in case the injury is such that the "hand, foot, thumb, finger, toe, or phalange, is not lost, but so injured as to be permanently incapable of use," materially changes the law as it stood prior to that time.

One of the cases bearing on specific compensation under the law decided by the Supreme Court, was the *Floccher* case. The decision is so important that I quote it in full:

"Frank Floccher, Employee.

Joseph V. Floccher, Employer.

Fidelity & Deposit Company of Maryland, Insurer.

Decision of the Supreme Judicial Court on Appeal.

PIERCE, J. The right of the claimant to receive a payment of \$10 a week for total incapacity is admitted, and such payments have been made from week to week as they became due.

The insurer does question that part of the decision which allows the claimant specific compensation for fifty weeks at \$10 a week, for permanent loss of the right arm (hand), under the provision of the Workmen's Compensation Act, St. 1911, c. 751, Part II, Sect. 11, as amended by St. 1914, c. 708. This amendment provides that the additional amounts to be paid 'in case of the loss of a hand, foot, thumb, finger, toe or phalange is not lost, but so injured as to be permanently incapable of use.'

This statute, so far as quoted, puts in implicit form the law as to the permanency of the injury assumed in *Meley's Case*, 219 Mass. 136, to be the reasonable construction of the words 'incapable of use,' as set down in St. 1911, c. 751, Part II, Sect. 11, as amended by St. 1913, c. 445. The words 'incapable of use' should receive a construction which, while fairly within their interpretation, is not narrow and technical, nor, on the other hand, so free and liberal as to give a right which the words themselves do not fairly import.

In the case at bar, for practical purposes, the ability to use the hand to the extent of a small amount of motion in the thumb and first finger, with the middle, ring and little fingers paralyzed, and with an interference of the circulation to such a degree that the hand goes to sleep, is negligible. The use approaches the infinitely small, and must be disregarded if we are to prevent the technical impairment of a humane provision of law. (*Meley's Case*, *supra*).

But it is said that an operation will aid the improvement of the thumb and forefinger by making them more accessible, and thereby leading to their being more used. If the claimant is not to be employed to unusual risk and danger arising from the anesthetic to be employed, or from the nature of the proposed operation, it is the claimant's duty to submit, if it fairly and reasonably appears that the result of such operation will be a real and substantial physical gain. (*Tutton's Case*, 1909, 2 K. B. 54; *O'Neill v. Brown & Co., Ltd.*, 1913, S. C. 653).

Does it appear that the result of an operation upon the claimant will be a real and substantial

gain? At present the elbow of the claimant's right arm is permanently gone, the right hand, save 'a small amount of motion in the thumb and first finger,' is paralyzed, and there is 'interference of the circulation, so that he has a hand that goes to sleep.' The operation proposed is to place the arm, under ether, in a right angle and then have the arm set. This leaves the elbow permanently impaired, but gives the arm a wider field of motion than when hanging at the side.

Dr. Donoghue said:

It will be a long while after the operation before he will acquire the use of his arm. You could not make any prognosis of it. . . With his arm at a right angle he would be able to do certain things. . . He could not do much at the end of a long, stiff arm. . . An operation would give him a stiff arm at a right angle, but he could button his clothes, or get his hand to his mouth, and he would be able to use it for various purposes which he could not do with it by his side. He would have a more useful arm bent in a right angle than he has at present, and one that he could use to do some work with. . . It is simply a question of impairment. It would be less impaired in a right angle than where it is. It would be pretty close to being permanently incapacitated for use, even after this operation.

Upon the testimony it could be found that it was pure speculation whether the hand ever would become in any normal sense a useful member.

No attempt was made to fix the limit of time within which the partial relief of the hand's total incapacity would become manifest, save that no prognosis could be made.

It well may be asserted that it would be unreasonable to put the claimant at least to the discomfort attending an operation the result of which would be the probability of a 'shoulder stretched out' and of 'muscles used up,' and in addition doubt as to the time within which some uncertain and indeterminate degree of benefit reasonably might be expected. The finding that the right hand 'is permanently incapable of use' was warranted, and no error of law appears. (*Herrick's Case*, 217 Mass. 111; *Meley's Case*, 219 Mass. 136.) The decree of the Superior Court must be affirmed.

So ordered.

May 20, 1915."

Another case bearing upon what should be considered total disability, is the case of *Ernest J. Lemieux vs. Contractors Mutual Liability Insurance Company*. The following is an abstract of the decision of the Supreme Court:

The employee sustained an injury which necessitated the amputation of all the fingers of the hand and the internal loss of bone structure, as indicated by x-ray photograph. The medical evidence, as well as the inspection of the member, showed that the hand had no use as such. The insurer claimed that, because the claim for compensation as filed did not allege the permanent incapacity of the hand, and the Board had approved an agreement for the payment of additional compensation for a period of twenty-five weeks on account of the "loss of three fingers," no further additional compensation was recoverable.

A hearing was had before the committee of arbitration upon the single question, "whether the injury was such as to render the hand permanently incapable of use." The employee and the insurer

were represented by counsel and, so far as appears, the hearing was held without objection. The committee found "upon all the evidence that the employee received personal injury. . . by reason of which his right hand was rendered permanently incapable of use."

This finding was affirmed by the Industrial Accident Board upon a review of the evidence, and was warranted by the visible external physical condition of what remained of a hand, as also by the internal loss of bone structure as shown by x-ray photograph; by the testimony of the employee as to how he could use it; and by that of the physician, who concluded his testimony with the statement that "the hand has no use as a hand." (Meley's Case, 219 Mass. 136; Floccher's Case, 221 Mass. 54.) There being reasonable evidence to support this finding, it is conclusive. (Herrick's Case, 217 Mass. 111; Sponatski's Case, 220 Mass. 526, 530; Burns' Case, 218 Mass. 8.)

*Specific Compensation for Eye Injury.* In regard to specific compensation for the lowering of vision below one-tenth, there have been a number of cases decided by the Board, none of which have been passed upon by the Supreme Court, but it is the feeling of the Board that in a case where the vision can be restored after an accident by a very powerful lens, and with that powerful lens it is impossible to use the injured eye with the uninjured, they have held that that is not a practical vision which comes under the meaning of the Act where specific compensation should be paid. In other words, function of any part of the body should be restored in a practical sense rather than a theoretic.

*Partial Compensation.* One portion of the law with which the doctors and the workmen are not familiar is Section 10, Part II, which provides for payments during partial incapacity, and which reads as follows:

"While the incapacity for work resulting from the injury is partial, the association shall pay the injured employee a weekly compensation equal to sixty-six and two-thirds per cent. of the difference between his average weekly wages before the injury and the average weekly wages which he is able to earn thereafter, but not more than ten dollars a week, and in no case shall the period covered by such compensation be greater than five hundred weeks from the date of the injury, nor the amount more than four thousand dollars."

The importance of this section is this: a man who has made a partial recovery can go to work and get partial compensation. He does not lose any rights by going to work, for if it is found after a reasonable attempt is made at work that he no longer can continue by reason of disability resulting from his employment, he then goes back upon total incapacity payments.

Under the old law, when a man went to work, it was sometimes considered that his rights had ceased, but under the new law his rights are still held, and there is no way that his rights can be taken away from him by the signing of a settlement receipt except by what is known as a lump sum payment which must be approved by the full Board.

The ordinary settlement receipt which the injured man is called upon to sign, does not take away his rights at all, so that he can at any time, when disabled, come in and claim his rights. If the doctors fully understood this section, I am con-

vinced that there would be many cases that would be encouraged to go to work as a curative measure a good deal earlier than they are now.

*Importance of Notice.* To preserve the immediate as well as the future rights of an employee and the rights of the doctor, it is well to see that a proper legal notice is given in each accident case. If the doctor is in doubt, he should see to it himself that some notice is given as provided by the following sections of the law.

Part II, Section 15:

"No proceedings for compensation for an injury under this act shall be maintained unless a notice of the injury shall have been given to the association or subscriber as soon as practicable after the happening thereof, and unless the claim for compensation with respect to such injury shall have been made within six months after the occurrence of the same; or, in case of the death of the employee, or in the event of his physical or mental incapacity, within six months after death or the removal of such physical or mental incapacity."

Part II, Section 16 (as amended by Chapter 172, Acts of 1912, and Section 3 of Chapter 571, Acts of 1912).

"The said notice shall be in writing, and shall state in ordinary language the time, place and cause of the injury, and shall be signed by the person injured, or by a person in his behalf, or, in the event of his death, by his legal representative, or by a person in his behalf, or by a person to whom payments may be due under this act or by a person in his behalf. Any form of written communication signed by any person who may give the notice as above provided, which contains the information that the person has been so injured, giving the time, place and cause of the injury, shall be considered a sufficient notice."

Part II, Section 17:

"The notice shall be served upon the association, or an officer or agent thereof, or upon the subscriber, or upon one subscriber, if there are more subscribers than one, or upon any officer or agent of a corporation if the subscriber is a corporation, by delivering the same to the person on whom it is to be served, or leaving it at his residence or place of business, or by sending it by registered mail addressed to the person or corporation on whom it is to be served, at his last known residence or place of business."

Part II, Section 18:

"A notice given under the provisions of this Act shall not be held invalid or insufficient by reason of any inaccuracy in stating the time, place or cause of the injury, unless it is shown that it was the intention to mislead and the association was in fact misled thereby. Want of notice shall not be a bar to proceedings under this Act, if it be shown that the association, subscriber, or agent had knowledge of the injury."

In the administration of the law, there has been dissatisfaction among physicians as well as among employees. The kind of treatment given when the injured person is referred to an open hospital outpatient clinic. This was brought to the attention of the Industrial Accident Board, and the position of the Board is stated in a ruling of January 2, 1917, which reads as follows:

"To All Insurers:

The following is a copy of the ruling issued by

the Board as the result of a conference upon the petition of certain members of the medical profession, in regard to the matter of furnishing hospital treatment to injured employees under the Workmen's Compensation Act?

The Industrial Accident Board is in receipt of the following 'protest' from various members of the Massachusetts Medical Society and the Massachusetts Homeopathic Medical Society, to the number of several hundred:

"The undersigned medical men wish to protest against the practice of a certain few insurance companies of referring their cases to open hospitals and clinics. If the patients go there themselves, well and good, but to 'furnish' medical care by referring the patient to a charity is virtually telling him to go take care of himself; it gives him no care or privilege whatsoever, which is not the intent of the Act, as we understand it.

We refer this question to your honorable body with the request for a ruling as to whether such reference can be considered adequate care within the meaning of the Act.'

After hearing representatives of the physicians and the insurers, the Industrial Accident Board states its position on the matter to be as follows:

The Board does not approve of the practice, if it exists, of insurance companies in referring cases to open hospitals and clinics, unless insurers have previously made arrangements with such hospitals and clinics for the furnishing of treatment to injured employees.

To 'furnish' treatment within the meaning of the Act imports, in the opinion of the Board, something more than a mere direction to an employee to go to an open hospital or clinic. It requires that the insurer shall make adequate arrangements for the care of those to whom the duty is owed in the event of injury. Such an arrangement between insurer and the hospital would imply that the hospital is prepared to give the injured employee reasonable services; and in any case where the adequacy of such service, arranged for between the insurer and the hospital is questioned, it will be considered by the Board on its merits."

### Book Reviews.

*Handicrafts for the Handicapped.* By HERBERT J. HALL, M.D., AND MERTICE M. C. BUCK. Illustrated. New York: Moffat, Yard and Company. 1916.

This book, by the authors of "The Work of Our Hands," aims to be a text-book of simple handicrafts to be used to train the partly incapacitated to perform some sort of lucrative labor. It is the belief of the authors that many handicapped persons, both in and out of institutions, may be assisted to earn, or help to earn, their livelihood by means of a knowledge of a simple and useful handicraft. The therapeutic value of suitable occupation to the nervous in-

valid and the convalescent has been ably demonstrated long since, and Dr. Hall's influence and example have been potent in the establishment of workshops in institutions and sanatoria of all kinds. It is but a step further to provide suitable facilities for training the permanently disabled in useful occupations which can be adjusted to their limited capacities. The book, a volume of 155 pages, presents in simple language, free from technical terms, an exposition of the rudiments of various kinds of handicraft—basketry, chair seating, netting, weaving, bookbinding, cement working, pottery making and light blacksmithing, giving a chapter to each, and including appropriate illustrations of tools, stitches, etc. The appendix consists of a list of books on crafts and a list of dealers from whom materials can be purchased. The book will, without doubt, be of much practical helpfulness to all who are interested in teaching and performing work of this character.

*The Diseases of Infancy and Childhood.* For the use of students and practitioners of medicine. By L. EMMETT HOLT, M.D., Sc.D., LL.D., Professor of Diseases of Children in the College of Physicians and Surgeons (Columbia University), New York; Attending Physician to the Babies' and Foundling Hospitals, New York; Corresponding Member of the Gesellschaft für Innere Medizin und Kinderheilkunde, Vienna, and Honorary Member of the Gesellschaft für Kinderheilkunde, Germany; and John Howland, A.M., M.D., Professor of Pediatrics in the Johns Hopkins University, Baltimore; Director of the Harriet Lane Home; Pediatrician-in-Chief to the Johns Hopkins Hospital; Corresponding Member of the Gesellschaft für Innere Medizin und Kinderheilkunde, Vienna. Seventh Edition, fully revised, with two hundred and fifteen illustrations. pp. 1180. New York and London: D. Appleton and Company. 1916.

This, the seventh, edition of Dr. Holt's work on the diseases of children, maintains the high standard of previous editions. It is now, as it has been ever since the first edition appeared, the best single book on the diseases of children in the English language. Some other books approach it in value, but none excel it.

The book has been thoroughly revised and reprinted from new plates in this edition. There are a number of new articles and many of the chapters have been entirely rewritten.

No physician or student can afford to be without this book. There are others which he needs, but he must have this one.

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## TROOP DISEASES.

THE mobilization and concentration of large numbers of troops presents to medicine just as much a new problem as it does to military organization, to economic, moral and social life. All the other problems are, however, in a manner adjective to the soldier's activities but the medical problems go to the very root of the individual's life—of his activities, as well as to the life of the community in which he must live during mobilization and after demobilization. The health of the soldier must be conserved not only for military purposes but to render him efficient in civil life afterwards. Modern science has by now rendered it possible to assemble troops on a large scale without the heretofore extraordinary mortality from the concentration alone. In most previous wars the general casualty from disease was much larger than that from the military operations themselves. It is

now the primary duty of the medical and sanitary organizations to find out all the dangers of locality and, where there is no choice, to render the place as fit as possible for occupation.

Aside, however, from the diseases to which troops are more likely to fall heir, there is an important communal disease element when such troops are billeted among the populace. Because of concentration most communicable diseases can get a better foothold and attain epidemic proportions very readily, although the good physical condition of the trained soldier tends somewhat to neutralize this tendency.

In Europe the most common troop disease spread to the populace was typhus. It is spread through the body louse and is, of course, the direct result of inability to cleanse properly the body in modern trench warfare. This disease seems to be endemic in many places under mild and usually unrecognized forms, only to break out in virulent form under appropriate provocation. This disease is very common in Mexico. In the United States a mild form was for a long time known under the name of its observer, "Brill's Disease," until identified by Anderson and Goldberger of the United States Public Health Service.

Almost universal vaccination against small-pox has practically eliminated this heretofore terrible scourge.

Modern anti-typhoid vaccination and water purification has taken the edge from typhoid. The epochal results achieved by this method on the Mexican border must ever redound to the ability of the medical men of this country.

Measles is a very common epidemic among troops. It has long been known to be a particularly serious disease and stubborn epidemic among primitive peoples. Since the knowledge that it is the catarrhal and not the desquamating period that is the contagious stage, very successful preventive work can be carried out with this disease.

The most recent medical problem that must be dealt with among troops is epidemic cerebro-spinal fever. This disease has long been recognized as a troop disease. Even in the Middle Ages there are fleeting references made to it in the medical literature. Great Britain has suffered a great deal from this disease among her troops, especially with those troops from Canada. Previous to the war this disease was a rarity in England, but now a great deal of it was found

among billeted troops and among the population thereabout (Horder). And, while the out-and-out cases could be easily diagnosed, so many of them were mild, rapidly fulminant or conforming to no type that diagnoses could not be made. Most of the cases presented at the onset only "influenzal" symptoms or during a short course had no other definite symptomatology. Only cultures from the throat or lumbar puncture would establish the correct diagnosis. But it can be seen that these very mild and uncharacteristic disease types, which go unrecognized and against which no preventive measures are taken, are more dangerous to a community than the characteristic manifestations.

The various diseases and conditions that have a special hold during the concentration of troops among a community make it incumbent upon the medical public to coöperate with the military medical men to discover and to control disease among troops, not alone for the sake of the military units, but as well as for the safety of the community among whom these troops must perforce remain. Probably the greatest of permanent benefits arising from war is the opportunity and the impetus given to preventive medicine and to epidemiological studies.

#### THE ETIOLOGY OF GOITROUS CONDITIONS.

THE etiological conditions at the bottom of such of the goitrous conditions as are exemplified by the simple enlargement of the thyroid gland, by cretinism, by myxedema and by exophthalmic goitre are still but very little understood. Even the great amount of experimental work recently undertaken has helped to clear up the mysteries to a small degree only.

Goitre and the allied conditions have a wide distribution throughout the world. They are endemic in certain parts of the United States. They are fairly common in the Great Lakes region and in certain parts of West Virginia. Their greatest area of distribution is, however, in the Alpine section of Europe. In general, there seems to be a limitation to temperate and subtropical regions; and there is a marked association with mountainous regions and formations. Moreover, in the West Virginia sections Clark (Public Health Reports, No. 184) found that from 9 to 13 *per centum* of the pupils ex-

amined had thyroid enlargement. But, very strangely, he found no cretins among them. Indeed, in this country, it is the experience, even in heavy goitrous sections, to find very little cretinism. In the endemic sections of Europe, however, the percentage of cretinism is very large. It is for this reason that there is quite a public health problem involved in immigration from these sections of Europe. There is no proof, nevertheless, that goitrous conditions are hereditary. Their apparent lineal nature is due to continuous residence in affected localities.

It was fairly well accepted that goitre is a water-borne condition, yet no investigator has yet been able to point definitely to any element that might justly be indicted. The development of the thyroid conditions is most common in the spring and autumn seasons. It must be remembered that during these seasons there is the greatest likelihood of water containing suspended matter being consumed, and, while this fact would seem to bear out the pollution theory, it has been found that the installation of water purification works, as was done in the case of the city of Vienna, Austria, had no effect to reduce the incidence of goitre. It was thought barely possible that polluted water might yet act indirectly in this respect by furnishing the necessary medium for the development of the exciting agent. Susceptible individuals develop the disease after a few weeks' residence in affected regions but are rapidly cured after removal therefrom. It has been found, further, that in such districts where safe and unsafe water are used only those who consume the unsafe water develop thyroid enlargement.

For a time hard water was blamed for the development of these conditions, but if it has any influence at all it seems to be rather an indirect one than an actual causative condition. It merely favors it under appropriate conditions. Goitrous water has a high bacterial content, and, for this reason, a living agent was thought to be at the bottom of the enlargement. This theory was much encouraged by the fact that boiling water thus affected or filtration through a Berkefeld filter rendered such water safe. Later on the theory was advanced that minerals having a high radioactivity predisposed to its development, and still later it was thought that the remains of ancient marine animals caused the condition. In any event the chemical and even



the bacteriological content of water depended largely upon the geological formation—upon the nature of the soil and upon the nature of the rock formation. Goitre is extremely common in localities with dolomite formations. It is extremely rare in other formations, although if other rock formations are very thin the water seeping through them may, nevertheless, become unsafe. It is, then, common in regions underlain by the Silurian, Carboniferous and Permian systems; it is rare over crystalline or eruptive formations. It is likewise rare over fresh deposits.

A very plausible theory more recently advanced is one in which it is set forth that, on the whole, goitrous water lacks certain chemical elements necessary for human economy—particularly iodine, and, indeed, in these hypertrophied thyroids, there is little of it present. In experiments with goitrous fish the addition of iodine, in the form of Lugol's solution, has effected speedy cures. In man the experiments have not been sufficiently tried out to warrant definite conclusions, but the results are, nevertheless, significant.

And, finally, there is a great deal of speculation and some experimentation that these conditions must be ascribed to faults in internal secretion. There is hope when the entire subject of the internal secretion has been more thoroughly developed that thyroid conditions will be found among them.

#### OCCUPATIONS TO BE ENTERED ON DEATH CERTIFICATES.

IN a recent circular letter to physicians, Samuel L. Rogers, Director of the Bureau of the Census, Washington, asks that more accurate and definite statements of the occupations of decedents be written upon death certificates. Although such entry is not now required by law, it will prove of great value in public health work and in the gathering of statistics for future tabulation and use, especially in mortality statistics by occupations. For instance, the Bureau of the Census is planning to issue in the near future a monograph on tuberculosis. How much more valuable this monograph will be if it is possible to show accurately the occupations of the decedents.

The JOURNAL would bespeak the coöperation

of all its readers in entering on every death certificate they are called upon to sign, the exact occupation of the decedent, so far as possible.

#### NOTICE TO PHYSICIANS.

AS A MEASURE OF PREPAREDNESS and, incidentally, as a health measure, every physician is requested to read the following notice regarding antitoxin bottles. PLEASE COMPLY WITH THIS REQUEST TODAY.

"Owing to war conditions, the State Department of Health finds a growing difficulty in obtaining supplies for the manufacture and distribution of diphtheria antitoxin and vaccine virus. There is, in particular, a shortage of bottles for antitoxin. All physicians throughout the State are, therefore, urgently requested to search for antitoxin bottles and return them to the Antitoxin and Vaccine Laboratory, Forest Hills, Massachusetts."

#### MASSACHUSETTS MEDICAL PERSONNEL

THE Joint Voluntary Committee on Medical Personnel for Massachusetts desire to make a brief report to the profession in relation to the card catalog of physicians of Massachusetts. About five thousand eight hundred cards have been sent out. This includes all names on the present registration list in Dr. Bowers' office. A little more than three thousand cards have been returned. More than one thousand three hundred individuals have also sent subscriptions in amounts varying from ten cents to considerable sums. The total received at present approximates nine hundred dollars. The Committee are deeply grateful for the generous subscriptions, and look forward to the possibility of an even thousand dollars total. They again wish to thank cordially all the subscribers, and once more ask most earnestly that the twenty-five hundred cards which are lacking may be returned just as soon as possible.

J. B. BLAKE, *Chairman*,  
A. B. EMMONS, 2d, *Secretary*,  
*For the Committee.*

#### MEDICAL NOTES.

RESULTS OF HEALTH SURVEY IN WEST VIRGINIA.—The Metropolitan Life Insurance Company has prepared a preliminary statement of the results of its health census taken in the

state of West Virginia during the first two weeks of March, 1917. Agents of the Company ascertained the state of health of nearly 46,000 persons in the leading cities of the state and found that 1,504 persons were sick in this group. This gives a sickness rate of 33 per 1000, or one sick person in every thirty of the population enumerated. Sickness rates prepared for other communities by the Metropolitan usually run from 20 to 25 per 1000. More sickness was found among coal miners than among other persons interviewed. The diseases and conditions enumerated by the agents taking the survey are of decided interest. Influenza was the leading disease enumerated, 226 cases, or 15.0% of all sicknesses, being so reported. Rheumatism was the disease next in importance, with 122 cases, or 8.1%. Whooping cough was found in 83 cases, or 5.5%. Diseases of the stomach were registered in 55 cases, or 3.7%; organic diseases of the heart in 50 cases, or 3.3%; tuberculosis of the lungs in 48 cases, or 3.2%; and measles in 47 cases, or 3.1%.

**COMMUNITY HEALTH IN PITTSBURGH.**—During the weeks of March 12 and March 19, 1917, the Metropolitan Life Insurance Company, with the coöperation of Dr. J. F. Edwards, Director of Public Health, conducted a health census of the city of Pittsburgh and in a few immediately adjacent towns. The health status of a little more than 127,000 persons was ascertained and 2,039 sick persons were enumerated. This number of persons enumerated is 22% of the total population of the city of Pittsburgh. It is especially important to know that this representative portion of the general population of Pittsburgh included a large number of men, women and children of the wage-earning classes. The sickness rate was 16 per thousand, or one sick person in every 63. Final conclusions cannot be drawn from the findings, however, until a further study of the figures is submitted in a final report. This health census has made it possible to discover the sickness rates of the more important industrial groups in the city of Pittsburgh. Among employees in the iron and steel mills the sickness rate was 20 per thousand, and among the glass factory workers it was 19 per thousand. These figures are but slightly higher than the sickness rates for the general group of the population enumerated and do not indicate any distinctly unfavorable health conditions. White persons showed a lower sickness rate (16 per thousand) than did colored persons (18 per thousand). The principal diseases enumerated in Pittsburgh were accidents and injuries which constituted 9.7% of the cases; rheumatism, with 8.3% of the cases; influenza, with 7.6%; pneumonia, with 5.7%; colds, coryza and rhinitis, 4.3%; tuberculosis of the lungs, 4.1%, and diseases of the stomach, 4.0%. In general, the findings for diseases and conditions among persons enumerated in the city of Greater Pitts-

burgh are very much the same as the average figures for the entire state of Pennsylvania, and indicate no special circumstances.

**DECLINING BIRTH RATES IN SCOTLAND AND FRANCE.**—A recent issue of the *Medical Press and Circular* reports an address made at a meeting in Edinburgh on January 28 to consider the declining Scottish birth rate.

"Councillor Stevenson said when it was stated that the birth rate for Scotland in 1915 touched the lowest point since the institution of national registration in 1855, and that during the last two years, doubtless owing to the effect of the war on the home life of the community, there had been an alarming increase in our infant mortality rate, the gravity of the problem must be patent to all. In 1871 there were 34 children born in Edinburgh for every thousand of the population; in 1915 only 17. In Canongate Ward the rate was 24; in Morningside 10.9. It was among our gardened villas where the degeneracy had been developed. It was time the State realized the gravity of the problem—time, too, for the Church to point out the peril towards which we were drifting. Along with the decreasing birth rate there was the high death rate among children before they attained the age of one year. In 1913, the last complete year before the war, the death rate was 109.6 per 1000. The great municipalities for the most part were fully awake to their obligations towards this great problem and Edinburgh had done splendid work. In 1898 the infant death rate of the city was 14.2 per 1000; in 1908 it dropped to 120, and since they had appointed a lady health visitor with 300 helpers, it had fallen steadily to 101. In 1914, with only five months of war, the infant death rate had increased to 110, and in 1915 to 132, a rate which had not been touched for nearly twenty years."

In France a similar condition prevails. Demographic statistics of that country for 1915 show, in the 76 departments which can be accounted for, in 1913, an excess of 15,645 births; in 1914, an excess of 53,327 deaths, and in 1915, an excess of 261,835 deaths. The figures do not represent correctly the births and deaths in the invaded departments in the war zone, where almost all the deaths of combatants are registered.

The present situation of France, as regards its birth rate is quite different from that prevailing in the past. In the issue of *Paris Médical* for December 16, 1916, Dr. Henri Raymond reports the following instance of extraordinary fecundity in a French family of the last century:

"Marie Dehen was born at Monsures in 1847, and bore her first child at the age of 18 and her last at 49. The sum of her contribution to the population of France was thirty-two, of whom eighteen were boys and fourteen girls. Eight of the former and seven of the latter are still alive. The others died in childhood. She had three miscarriages. As her periods did not cease till

she was 60, she might have continued her good work still further but for the death of her second husband. Only at the birth of her first child did she have the assistance of a doctor; his ministrations taught her all she wanted to know, and in all her subsequent confinements she managed for herself. She got up on the day after the happy event and carried the baby in her apron to church for baptism. Her experience has led to her employment as the local midwife, an occupation which she varies with that of tender of cows. Her surviving offspring, though quite healthy, have given no proof of remarkable fecundity, with one exception. A daughter who married at 25 and is now 35, has had ten children in ten years and now awaits the arrival of the eleventh. Marie Dehen is known among her own people as 'the woman with thirty-five children.' The facts may be accepted without question, as they are recorded in the registers of the *Mairie* and the parish."

UNIVERSITY COLLEGE, LONDON.—Next October women medical students will be admitted to the department of anatomy of the University College, London.

ELECTION OF OFFICERS.—The George Washington University Medical Society, composed of the alumni and faculty of the medical school, at a recent meeting, elected Dr. W. Ashby Frankland, president; Dr. Coursen B. Conklin, vice-president; Dr. Thomas Miller, secretary; and Dr. Edward G. Seibert, treasurer.

LONDON DEATH RATES IN 1916.—Statistics recently published show that the total death rate in London in 1916 was only 14.3 per thousand inhabitants living. Among the several districts and boroughs the highest was 18.6 in Finsbury, a crowded central slum, and the lowest was 10.3 in Hampstead, an open suburb on the north.

LONDON DEATH RATES IN FEBRUARY, 1917.—In February, 1917, the total death rate of London was 21.3 per thousand inhabitants living. Among the several districts and boroughs, the highest rate was 26.5 in Shoreditch, a crowded east side slum, and the lowest was 16.1 in Hampstead.

SPECIAL GRADUATE COURSE AT SPOKANE, WASH.—A graduate medical course will be conducted at the new St. Luke's Hospital, Spokane, during the summer. Among those whom it is planned to have lecture are Drs. W. T. Councilman, Harvey Cushing, Walter B. Cannon, Fritz B. Talbot, James S. Stone, George Holmes, David L. Edsall and Francis W. Peabody, Boston; William G. MacCallum and Warfield T. Longcope, New York; Llewellys F. Barker and Theodore C. Janeway, Baltimore; and Rollin T. Woodyatt, Ludvig Hektoen and Harry G. Wells, Chicago.

NATIONAL ACADEMY OF SCIENCES.—At the annual meeting of the National Academy of Sci-

ences, held in Washington, many interesting papers were read and discussed. Dr. Erwin F. Smith, pathologist in charge of the laboratory of plant pathology of the Department of Agriculture, reported the results of his experiments with crown gall in plants to cancer in man.

"Two very important results have been obtained by Dr. Smith within the last sixteen months. The first of these is the discovery of a new type of crown gall tumor, and his ability to reproduce these tumors at will by inoculating plants in particular places. The newer type of plant tumor discovered, according to the investigator, corresponds to the most complex type of malignant tumors in man and animals. The second important phase of his work has been the production of small tumors in the absence of tumor-producing organisms, that is, with chemical products of tumor bacteria, and he believes that this is the first time that experiments have proved tumors were due to chemical products of the bacteria, slowly liberated within the cells of the attacked plant.

"If I am correct in my view that the plant disease under consideration is a cancer, then it throws a flood of light on the unknown or obscure origin of cancers in man and animals, making it practically certain that they are due to parasites, but not necessarily the one I studied. Using the word 'cancer' in the broad sense for all malignant tumors of man, nothing is known at present of its cause. Although they have no other satisfactory way of explaining it, the greater number of cancer specialists have come to the conclusion that it cannot be due to parasites."

Dr. W. V. King, of the Bureau of Entomology, wrote a paper on "How Mosquitoes are Infected by Malarial Parasites."

"Dr. King has made some remarkable discoveries in regard to malarial parasites which infest certain mosquitoes previously thought not to be carriers of disease. His report dealt with some of his experiments conducted in the laboratory of Dr. C. C. Bass, Tulane University, New Orleans, where he is now engaged in work."

Dr. Simon Flexner, of the Rockefeller Institute, spoke on certain mechanisms that defend the body from the attacks of infantile paralysis; Drs. Jacques Loeb and J. H. Northrup, on what determines the natural duration of life; Dr. Frank R. Lillie, of the University of Chicago, on sex-determination and differentiation in mammals.

UNIVERSITY OF OREGON MEDICAL SCHOOL.—A new laboratory, costing \$115,000, is to be erected by the University of Oregon Medical School on Portland Heights. The new site, some twenty acres, was the gift of the Oregon and Washington Railroad and Navigation Company. Its altitude affords a wonderful view of the surrounding mountains and rivers.

## WAR NOTES.

CANADIAN PHYSICIANS IN THE WAR.—The work of the Canadian medical profession during the war has shown a standard of efficiency on a par with that of the service rendered by the troops and other agencies of the Dominion. Some details of this work are described as follows in a recent issue of the *Lancet*.

"According to a statement recently issued by Sir Edward Kemp, Canadian Minister of Militia and Defense, the Canadian Army Medical Corps number approximately 1800, of whom 500 are in Canada and the balance serving overseas. A large proportion of those in Canada are carrying on the work of the Canadian Military Hospitals Commission. In addition to the above numbers there are 400 civilian practitioners partly employed in military work in Canada, and over 400 Canadian doctors have proceeded overseas to join the Royal Army Medical Corps. In a short time other physicians in the Dominion desirous of serving will be given an opportunity of assisting in the work of attending invalided soldiers returning to Canada. That work is now to be divorced from the Canadian Hospitals Commission and assumed by the Canadian Army Medical Corps, under the direction of a Director of Medical Services for Invalids, Commission continuing the provision of hospital accommodation as it is needed, and the maintenance and equipment thereof. Colonel Frederick W. Marlow, A. D. M. S., has made an official report to the Militia Department on the general arrangements of the Canadian Army Medical Corps. Travelling all over Canada, Colonel Marlow's work of inspection had a wide scope. His report has been considerably discussed since the Canadian Government made it public property. In general, Colonel Marlow recommends: The completion of the reorganization of the Medical Service, thus bringing the medical branch of the service up to the required standard; the increasing of administrative staffs; the appointment in some districts of officers brought back to Canada from overseas; consideration of the advisability of increasing the Permanent Army Medical Corps for duty in Canada; frequent inspections of all districts and camps, for which purpose the appointment of an inspecting officer would seem advisable; depot units of fixed establishment to replace or supplement the present reinforcement plan, and closer relation between home and overseas service so as to minimize wastage; a plan whereby specialists may proceed overseas without undue delay in Canada; the gradation of officers entering the service, so that experience and special ability will count; the advisability of providing term contracts for service; improvement of laboratory facilities; installation of fumigating plants at camps and military hospitals; close coöperation between the Canadian Hospitals Commission and the Canadian Army Medical Corps; and the establishment of large

hospitals in Halifax, Quebec, Montreal, Toronto, Winnipeg, Edmonton, and Vancouver. One of the recommendations, that of the transference of the returned soldiers to the Canadian Army Medical Corps from the Hospitals Commission, has already been adopted.

MEDICAL PREPAREDNESS AT THE UNIVERSITY OF MICHIGAN.—At its meeting on April 2, 1917, the faculty of the University of Michigan Medical School adopted the following resolutions, which were published in the issue of *Science* for April 20.

"1. It is the opinion of the faculty of the University of Michigan Medical School that in meeting the demands for medical officers in the national service, the military authorities should give first preference for enlistment to the members of the medical classes of the past two years, viz., 1915 and 1916.

NOTE.—These young men have recently finished their medical courses and having taken, in part or altogether, their hospital training, should have the latest and best information in scientific medicine, and not having as yet established themselves in practice, are best fitted to be selected for military service.

2. In view of the probably urgent demands for trained medical men, the faculty of the University of Michigan Medical School desires to place itself on record as being ready and willing to make its courses of instruction continuous through the summers of 1917 and 1918. This proposition will be submitted to the various state boards of licensure for their approval.

NOTE.—If this provision goes into effect, a week after the close of the present session, the session of 1917-18 will begin. Those who are now juniors will become seniors and may be graduated in January, 1918.

NOTE.—In taking this step, not only the military demands upon the medical profession, but civil demands as well, are taken into consideration.

3. Taking into consideration the future needs of the country for trained medical men, it is the opinion of the faculty of the University of Michigan Medical School that it is advisable for the undergraduate medical students to complete their course of instruction and not to enlist.

4. The faculty of the University of Michigan Medical School recommends that not less than two hours per week be set aside for the military drill of undergraduate students, and that, in addition to the ordinary infantry drill, we recommend training along the lines developed by the Clinical Society of Albany, and known as the 'Albany Plan.'

NOTE.—The medical officer should, first of all, be a soldier. This is necessary in order to make him most efficient as a medical officer.

5. That copies of these resolutions be furnished for suggestions of approval or disapproval to the following bodies:

(1) The surgeons-general of the army and navy.

(2) The National Medical Committee on Preparedness.

(3) The National Research Council.

(4) The faculties of other medical schools.

6. That a list of the graduates of the classes of 1915 and 1916, with their standing while in the school and their present addresses, be sent immediately to the surgeons-general of the army and navy."

**WAR RELIEF FUNDS.**—On May 5 the totals of the principal New England war relief funds reached the following amounts:—

Belgian Fund .....	\$598,046.57
French Wounded Fund .....	224,583.54
Armenian Fund .....	180,623.84
Permanent Blind Fund .....	108,062.35
French Orphanage Fund .....	96,584.99
Surgical Dressings Fund .....	84,127.47
Boston Ambulance Fund .....	79,564.23
Metropolitan Red Cross Fund ..	57,626.13
LaFayette Fund .....	26,842.03
Russian Ambulance Fund .....	6,764.11
Marshal Joffre Fund .....	3,587.00

#### BOSTON AND MASSACHUSETTS.

**SCARLET FEVER IN SHELBURNE FALLS.**—So many cases of scarlet fever, whooping cough and measles are reported in Shelburne Falls that it has been found advisable to close schools.

**LEOMINSTER HOSPITAL.**—At the March meeting of the executive committee of the Leominster Hospital, the report was made that that hospital is at the present time a self-supporting institution.

**LYNN HOSPITAL.**—According to the Lynn Hospital superintendent's report for February, the average number of patients was the largest ever reached by the institution.

**CONTAGIOUS HOSPITAL IN WORCESTER.**—The proposition of establishing a hospital in Worcester for the care of contagious diseases is under discussion, but no definite steps have yet been taken. It was considered possible for the House of Mercy to undertake the construction of an extension or addition, connected by a passageway, which could be used for the care of such cases, but it was not deemed advisable to undertake such a proposition at the present time.

**MATERNITY HOSPITAL IN BOSTON.**—Mrs. William Lowell Putnam, with the Prenatal Care and Obstetrical Committee of the Women's Municipal League, has urged that a maternity

hospital be instituted for the purpose of caring for women of the middle class who are unable to afford the services of a private institution and who are not in the class with those poor who are admitted to the public wards at the city hospitals and therefore very often do not get the proper care. It was at first proposed that a new building be built, but it has been found that with certain changes in the Boston City Hospital it may be possible to utilize one of the present buildings.

**FUND FOR NEW ENGLAND HOSPITAL.**—The New England Hospital for Women and Children in Roxbury is conducting a campaign to raise a fund of \$200,000 for the equipping of a maternity department. The constantly increasing demand for accommodation of maternity cases led to the beginning, last year, of a new building adequate to care for 1300 maternity cases a year. The Hospital does not receive state or city aid, and is the only Boston institution conducted entirely by a woman medical and surgical staff. William C. Williams, vice-president of the Boston Safe Deposit and Trust Company, has assumed the chairmanship of the campaign organization. Thomas P. Beal, president of the Second National Bank of Boston, is acting as campaign treasurer. About 200 volunteers are participating in the campaign under twenty-five to thirty team captains. On April 30, \$54,781.21 had been pledged.

**TWO ADDITIONAL HEALTH UNITS.**—The Boston Board of Health will establish two more health units similar to the one established about a year ago on Blossom Street, West End. The new ones will be established in the old police stations in East Boston and South Boston. \$8500 is appropriated for this purpose.

**THE FRAMINGHAM EXPERIMENT.**—The residents of Framingham, Mass., have responded to the efforts of the Community Health Committee, and 537 families, or about 1600 persons, have presented themselves for physical examination. So few persons were left in the township that messengers were sent to their homes for them. The examinations were conducted by a staff of fifty physicians, eighteen laboratory workers and twenty-five nurses. Whatever may be discovered of an unfavorable nature will be reported to the person examined. Individuals needing treatment will be referred to local physicians of their own choosing for medical care. In instances where tuberculosis has been discovered, a special effort will be made to see that adequate facilities are provided for thorough medical treatment.

**INFANTILE PARALYSIS IN LYNN.**—The first death of the year due to infantile paralysis, in Lynn, occurred on April 27. The victim was a girl of fourteen who was a student in Notre Dame Academy, Roxbury.



**HEALTH INSURANCE.**—The Committee on Social Welfare has reported a resolve in the Senate providing for a special recess committee to investigate further the questions of health and sickness insurance. The committee is to consist of two members of the Senate, four members of the House, and two members to be appointed by the Governor. In recommending this further investigation, the committee state as reasons:—

"We must know to what extent private systems have reduced the amount of time lost by wage-earners.

"What proportion of the wage-earners are at this time benefiting from existing insurance systems.

"Whether they are showing a greater efficiency now than before these systems were established.

"Whether there is agreement between employers and employees as to the workableness of health insurance in this country.

"What the cost will be to the employer, employees and the Commonwealth for the maintenance of a comprehensive system of health insurance.

"What grounds the proponents of health insurance have, for the claim that the movement has been successful in European countries.

"In view of the fact that Norway, Roumania, Russia, Serbia, Great Britain, the Netherlands, Germany, Austria, Luxemburg and Hungary have all adopted compulsory health insurance, and that several state legislatures have authorized a thorough study of the entire subject of social insurance, the opponents of such insurance must produce stronger evidence than any yet offered, to show why Massachusetts may not in the near future seriously consider some form of health insurance, together with maternity benefits and unemployment insurance.

"Much has been said at the hearings which may well lead us to give careful consideration to the words of Governor McCall in his inaugural message.

"If protection against the overtaxing of those engaged in industry can best be secured by the adoption of some system of health insurance, then that is what all of us, as good citizens, should work for.

"If, on the other hand, it is impossible to substantiate claims of those who testified to the success of health insurance in State and country-wide movements, then the Commonwealth may well hesitate to embark on the venture."

**HOSPITAL BEQUEST.**—By the will of the late Gustavus J. Peavy, the Mt. Sinai Hospital Society is the recipient of \$1000, and the Boston Society for the Relief and Control of Tuberculosis of \$200.

**CAMPAIGN FOR PREVENTION OF INFANTILE PARALYSIS.**—The campaign which the Harvard Infantile Paralysis Commission, in cooperation with the State Health Department, is preparing to wage this summer against that dreaded disease, has been materially strengthened by the organization of a large committee of citizens, with Joseph G. Minot as chairman. It is proposed to raise a fund of \$150,000 to finance the campaign. The equipment of the Harvard Medical School laboratories is ready for the preparation of serum or for any other purposes. Local physicians are invited to the clinics at the Massachusetts General Hospital and the Children's Hospital, and large groups of physicians are attending the clinics which have been established in Worcester, Springfield, Lowell, Lawrence, Newburyport, Lynn, Beverly, Malden, Melrose, Quincy, North Adams and Greenfield. Dr. Robert W. Lovett is chairman of the commission; other members are Dr. Milton J. Rosenau, Dr. Francis H. Peabody, and Roger Pierce, secretary. Subscriptions to the Harvard Infantile Paralysis Fund should be sent to Kidder, Peabody & Co., 115 Devonshire Street.

#### NEW ENGLAND NOTES.

**RHODE ISLAND.**—John George O'Meara, M.D., who is a representative in the House of Representatives in Rhode Island, presented a resolution in that assembly recently, endorsing the daylight-saving movement. This resolution, which was discussed from a health and sociological plan by Dr. O'Meara, was passed both in the House and the Senate.

Plans for the enlarged work next summer of the Providence Floating Hospital are progressing rapidly. A campaign to raise the very necessary \$10,000 is on.

**VERMONT.**—The ninth annual report of the Brattleboro Mutual Aid Association is clearly indicative of the useful place which this public-spirited institution is filling in its community. As has previously been noted in this JOURNAL, the object for the organization of the Mutual Aid Association, as stated, is "to do what is possible to supply those needs in sickness that are not now properly covered by hospital service, by the visiting nurses, or by unorganized private nursing." As an illustration of the manner in which the Association is fulfilling its purpose, it may be interesting to quote the report of the assistant superintendent, who has recently assumed charge of the work.

"My work during the year has been somewhat varied (assisting and helping wherever needed).

"In addition to doing the housekeeping, this work included assistance in supervising and teaching the attendants, and during the winter months it included helping the school nurse with her work; at one time I assisted in examining 176 children. As the West Brattleboro school was not included in her district then, I was

called out there quite often to look after children. At the time of the tonsillitis epidemic all the children's throats required examination, those with temperatures being sent home; also from time to time many children required visiting in their homes. Four talks were given to the mothers at Parent-Teacher Associations during the winter, there being meetings for the purpose in both districts. Ten social service cases were reported; where food and clothing were needed, these cases were referred for help to the town, or to the Associated Charities, and were visited and advised occasionally. I visited from time to time all the tubercular patients on our list, and investigated all cases reported. At Christmas there was visiting of needy families with children, and lists were sent to the committee on the municipal tree. While attending office every Friday afternoon, I had a class for the attendants. Previously they have been unable to attend class regularly, this being due very often to the distance of their cases, and also the inability to leave a patient during class hour. This year, however, we are sending those attendants unable to attend class a list of questions to be answered and returned during the week. During June and July all the homes where they had measles were visited, and instruction and advice were given to the mothers. I also visited the summer playgrounds and co-operated with Miss Clapp, the teacher, in looking after the children. All children who were sick or injured, also cases where there was sickness in the home, she reported to us; in that way we were able to reach many cases of which, otherwise, we would not have known. At one time a suspected case of infantile paralysis was reported; after investigation it was found that the child died of other causes. At another time eighteen cases of impetigo were reported, and fifty visits were made by our nurses before they were cleared up. During June and July I substituted for the district and maternity nurses while they were on their vacations, and in September I attended office while the secretary was on her vacation.

"The statistics for the past year show a most gratifying increase in most of our work. Of the 158 births recorded at the town clerk's office, 147, or 93%, had a graduate nurse present at the birth (which is many times the proportion found in other districts recently investigated in various parts of the country)."

"The number of calls filled by our attendants has increased over last year, which confirms the fact that the doctors and families appreciate the nursing service supplied them.

"Owing to our good fortune in getting a Ford runabout, we have been able to visit many homes in outlying districts, for both prenatal and general care. We also have had the advantage of supervising and following up our attendants."

## The Massachusetts Medical Society.

### NOTES FROM THE DISTRICT MEDICAL SOCIETIES.

**BERKSHIRE DISTRICT MEDICAL SOCIETY.**—Berkshire County is forming an evacuation Ambulance Corps with a full equipment. The originator and leader of the movement is Dr. Austin Fox Riggs of Stockbridge, who has as his chief assistants, Dr. John Blanchard Thomes, Dr. M. H. Walker, Dr. Thomas Littlewood, Dr. Harry Tate, all of Pittsfield. These are now enlisting and training a full quota.

Dr. I. S. F. Dodd of Pittsfield has received his commission as a captain in the Army Reserve Corps, and Dr. Frederick H. Howard of Williamstown has been appointed a lieutenant in the same corps.

Berkshire District held its annual meeting April 26, at which time Dr. F. B. Lund of Boston spoke on "Early Manifestations of Cancer." At the election of officers for the coming year, Dr. Ayres Philip Merrill was elected president; Dr. Vanderpoel Adriance of Williamstown, vice-president; Dr. O. L. Bartlett, secretary; and Dr. J. T. Howe, treasurer; Drs. Thomas Flournoy and M. H. Walker, committee of arrangements.

On April 24 the North Berkshire Medical Club held its regular meeting under the presidency of Dr. M. M. Brown, Dr. W. E. Preble of Boston gave a very interesting paper on "Mistakes in Diagnosis."

A. P. MERRILL,

*District Correspondent.*

**NORFOLK DISTRICT MEDICAL SOCIETY.**—The Norfolk District Society has recently sent the following circular letter to all regular physicians, resident in its territory, who are not members of the Society:

"You are a resident within the limits assigned to the Norfolk District of the Massachusetts Medical Society. We cordially ask you to consider the advantages of our fellowship. We wish to include in our membership all our reputable medical men, that we may stand as a united body for the best in all medical matters.

This last year we had most interesting meetings, with such topics, as, for example: Chronic Nephritis, by Dr. David L. Edsall; Cancer, cases and pictures shown by the staff of the Huntington Hospital; and a visit to the Infants' Hospital, with papers and cases shown by members of its staff.

We meet on the last Tuesday evening of each month from October to April, listen to papers and share in the discussion, and then have a social hour with refreshments. Our present membership is 560, and at our regular meetings, which are held at the Masonic Hall, 171 Warren Street, Roxbury, five minutes from the Dudley Street Transfer Station, usually have 125 members present.

Our annual meeting, held in May at a Boston Hotel, with a banquet followed by an entertainment supplied by our own Fellows, is a social event to which we all look forward, and is attended by 200 Fellows.

The examination for admission is now an oral examination only, by the Censors, whose next meeting is May 10, 1917, at the Masonic Hall, above noted.

As a member of our parent Massachusetts Medical Society you will receive the *BOSTON MEDICAL AND SURGICAL JOURNAL*, will share in the annual meetings held in June in Boston, and will have the protection of the Society by legal counsel in any malpractice suits brought against you.

If you would like to join us, telephone our secretary, Dr. Bradford Kent, Dorchester 15, and he will send you the necessary blank to fill out, and give you any other information you desire.

THOMAS F. GREENE,  
*President.*

**WORCESTER DISTRICT MEDICAL SOCIETY.**—The regular weekly lecture of the Worcester Extension Course of the Harvard Graduate School of Medicine was by Prof. Walter B. Cannon at City Hospital, Worcester, on April 25, 1917. This was his second and concluding lecture on "Ductless Glands."

The attendance throughout the course has been large, and the members have expressed themselves enthusiastically in appreciation of the excellence of the instruction they have received.

Dr. Cannon's lectures terminate the course in Internal Medicine. Recognizing, however, that with the enactment into law of the amendment to the Workingmen's Compensation Act, granting to the injured workman the right to select his own physician, a duty has fallen upon the rank and file of the medical profession to fit themselves to fulfil the economic and professional requirements of industrial accident work, the officers of the Extension Course have arranged with the Graduate School for two lectures on Industrial Surgery, by Dr. Frederic P. Cotton, of Boston, which will be open to the members of the former course without extra fee, and to other physicians by payment of a fee of two dollars. The first lecture was at Worcester City Hospital at 7.30 p.m., Wednesday, May 2.

E. L. HUNT,  
*Secretary.*

### Obituaries.

#### EPHRAIM CUTTER, M.D.

EPHRAIM CUTTER, M.D., a retired Fellow of the Massachusetts Medical Society, died at his home in West Falmouth, Massachusetts, April 25, 1917, at the age of 84. He was born at Woburn, September 1, 1832, the son of Dr. Benja-

min Cutter; was graduated from Yale College in the class of 1852, and from Harvard Medical School in 1856, receiving an M.D. also from the University of Pennsylvania in 1857, and an LL.D. from Iowa College in 1887. Dr. Cutter took the Boylston Prize in 1857 with an essay entitled, "Under What Circumstances do the Usual Signs Furnished by Auscultation and Percussion Prove Fallacious?" He published books on "Contributions to the Treatment of Versions and Flexions of the Unimpregnated Uterus," 1876; "Clinical Morphologies," 1888; "Food in Motherhood," 1890; also many contributions to medical periodical literature. He invented a eustachian catheter and a laryngoscope, and was one of the first to photograph the human larynx. One of his chief life interests was food, claiming that improper feeding was the cause of a large number of the ills of the human flesh. For many years he made his headquarters in New York City, although having a residence at West Falmouth. Dr. Cutter was twice married, his first wife, Rebecca Smith Sullivan, of Cambridge, dying in 1899; his second wife, Mrs. Anna L. Davidson, and two sons by the first wife, surviving him.

#### HERBERT B. MCINTOSH, M.D.

HERBERT MCINTOSH, M.D., a Fellow of the Massachusetts Medical Society, died at his home in Cambridge, April 24, 1917, aged 60 years. He was a former resident of Medway, where he once served as medical examiner for the seventh Norfolk District and as chairman of the school board. The son of George M. and Elizabeth Fretz McIntosh, he was born at Doylestown, Pennsylvania, January 20, 1857; was educated at Brown University, where he was graduated in 1885, and became an instructor at Worcester Academy, studying law at the same time. In 1888 he was admitted to the bar, and in 1896 he took the degree of M.D. from Bellevue Hospital Medical College; married Elizabeth E. Ellard in the same year, and settled in Medway in the practice of medicine. In recent years he had had an office in Boston, and had lived within the confines of Greater Boston, giving special attention to roentgenology and electrotherapeutics. His widow survives him.

### Correspondence.

#### TOXIC JAUNDICE AMONG MUNITION WORKERS.

Boston, April 30, 1917.

Mr. Editor:—

The following is a copy of a letter which I have received from J. N. W. MacAlister, Secretary of the Royal Society of Medicine, London, and in view of the increasing importance of this subject, I ask that you give this the publicity of your columns that those interested in the subject may have an opportunity to send on their subscriptions.

F. D. Donoghue, Esq., M.D.,  
Industrial Accident Board,  
Boston, U. S. A.

Dear sir:—

On the suggestion of Dr. T. M. Legge, Medical Inspector of Factories for the Home Office, I write to inform you that we are about to publish a report of a discussion that has been held here on toxic jaundice among workers in T. N. T. factories. The discussion was opened by Dr. Legge and the following, among others, contributed:

Dr. T. M. Legge (H. M. Inspector of Factories), Lord Chetwynd, Capt. M. J. Stewart, R.A.M.C., Dr. Benjamin Moore, F.R.S., Dr. Spilsbury, Dr. H. M. Turnbull, Dr. I. Feldman, Surgeon-General H. D. Rolleston (Chairman), Dr. E. L. Collis, Major Morley Fletcher, R.A.M.C., Dr. O'Donovan (Med. Adviser, Ministry of Munitions), Fleet-Surgeon B. C. Munday, Dr. Castellain, Major P. S. O'Reilly, R.A.M.C., Dr. W. R. Smith (Beeston).

The discussion was held with the approval of the Ministry of Munitions, which sent its principal medical officers either to take part or to listen to it.

As editor of the "Proceedings," I can print only enough copies for our ordinary supplies and if, as Dr. Legge seems to think, there might be a demand among American factories for copies, I ought, if possible, to know at once, as after the one edition has been struck off it will not be possible to procure copies.

I may add that the Report is fully illustrated with colored and other illustrations of post-mortem specimens, etc.

Separate copies of the Report can be bought for five shillings, and for America (say) \$1.00. If ordering single copies, 10 cents should be added for postage; but parcels of a dozen or more would be sent carriage free.

Dr. Legge, who has advised me to write to you, suggests that if this letter is not addressed to the proper department to deal with the matter, perhaps you would be good enough to pass it on to the proper department.

Faithfully yours,  
(Signed) J. N. W. MACALISTER,  
Secretary.

Yours very truly,  
FRANCIS D. DONOGHUE, M.D.

P. S. The present bibliography of Trinitrotoluene poisoning:

*The Lancet*, Dec. 16, 1916.

"Precautionary Measures," Factory Department, Home Office, March, 1916.

"Rules for the use of Trinitrotoluene, made by the Minister of Munitions in pursuance of Regulation 35 A.A. of the Defence of the Realm," obtainable through T. Fisher Unwin, Ltd., London, W. C. 1917.

"The Prevention, Symptoms and Treatment of Tetral Dermatitis," by Enid Smith, M.B., B.S., London, April, 1916.

#### THERMOMETER DISINFECTION.

483 Beacon Street, Boston, April 16, 1917.

Mr. Editor:

Your editorial, "Thermometer Disinfection," which appeared in the *JOURNAL* of April 12, 1917, has interested me very much. The subject, I feel, is of considerable importance, and I was glad to see an editorial discussion on this matter. The following simple device, I found to solve the problem of thermometer disinfection both in office and home calls.

The regular heavy "Board of Health" 5-inch test tube, when filled with alcohol and fitted with a tight

cork, makes an ideal thermometer-carrier. A small piece of absorbent cotton, placed at the bottom of the test tube as a padding, will prevent possibilities of breaking the thermometers. I keep two thermometers in the test tube of alcohol. By boring a small hole in the lower end of the cork, I am able to keep one of the thermometers inserted in the cork and thus suspended in the alcohol while the other is standing up loosely in the tube completely submerged in the alcohol. I always use the one inserted in the cork; this is in turn immediately replaced by the second one while the used one is put back into the tube completely submerged in the alcohol. In this way each thermometer is sure to receive an alcohol bath for from one to several hours before it is used again. I always like to wipe off the thermometer with a sterile sponge or gauze soaked in alcohol before and after using. More than one test tube can be fixed up in the same way and labelled 1, 2, 3, etc., for men with large practice, and used in rotation. Repeated cultures from such thermometers were found negative.

I believe this a very simple procedure to be adaptable to busy men in general practice and will do away with the more or less repugnant odor of formaldehyde as suggested by B. E. Hobbsendorf, referred to in your editorial.

Respectfully yours,

LEON S. MEDALIA.

#### MEDICAL OFFICERS' RESERVE CORPS.

Mr. Editor:—

"Application blanks for Medical Officers' Reserve Corps and for other branches of the United States service were printed in the *Journal of the American Medical Association*, April 21, 1917.

"As it has been difficult to print and distribute from the War Department a supply of these blanks sufficient to cover every section of the country at short notice, the use of the form printed in the *Journal of the American Medical Association* will greatly facilitate progress in this connection. Your coöperation in bringing this matter to the attention of the physicians throughout your state will, therefore, be greatly appreciated."

The above paragraphs have been taken from a letter received from Dr. F. F. Simpson, Chief of Medical Section, Council of National Defense. This method has been chosen to bring it to the immediate attention of the medical profession of Massachusetts.

J. B. BLAKE, Chairman,  
State Committee for Medical Preparedness.

#### REGISTRATION OF PHYSICIANS.

Worcester, Mass., May 3, 1917.

Mr. Editor:—

I hope that everyone will carefully read Dr. Bowers' lucid explanation of the new registration law, which appears in to-day's *JOURNAL*.

Legislators have written me, stating that so much abuse has been heaped upon them by physicians on account of this law that they felt disinclined ever to help the medical profession in any matter again.

Twenty-five cents and one short journey seems a small price to pay for the protection offered to legitimate practitioners by the re-registration item, and with the other provisions of the law there can certainly be no quarrel.

Very sincerely,  
SAMUEL B. WOODWARD, M.D.

#### UNITED STATES CIVIL-SERVICE EXAMINATION.

ANATOMIST.

MAY 16, 1917.

The United States Civil Service Commission announces an open competitive examination for anatomist, for both men and women, on May 16, 1917. A vacancy in the Army Medical Museum, Office of the

Surgeon General, Washington, D.C., at \$1,600 a year, and future vacancies, requiring similar qualifications, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion.

As prerequisites for consideration for this position the appointee must have at least a collegiate degree, and have a thorough knowledge of the anatomy (and be experienced in the dissection) of disease-bearing mosquitoes of Southern United States, Panama, and the West Indies, and the Philippine Islands, and the relation of mosquitoes to the transmission of disease. A knowledge of pathology, bacteriology and pathologic histology is also required, and the appointee must be capable of making photomicrographs, must understand microscopes, and be able to prepare, card, and keep in order museum specimens.

Applicants must have reached their twenty-first birthday on the date of the examination.

Applicants must be examined in the State or Territory in which they reside and have been actually domiciled in such State or Territory for at least one year previous to the examination, and must have the county officer's certificate in the application form executed.

Applicants must submit to the examiner on the day of the examination, their photographs, taken within two years, securely pasted in the space provided on the admission cards sent them after their applications are filed. Tintypes or proofs will not be accepted.

This examination is open to all citizens of the United States who meet the requirements.

Applicants should apply at once for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C. Applications should be properly executed, excluding the medical certificate, and filed with the Commission at Washington in time to arrange for the examination at the place selected by the applicant. The exact title of the examination as given at the head of this announcement should be stated in the application form.

#### SOCIETY NOTICES.

**ESSEX SOUTH DISTRICT MEDICAL SOCIETY.**—The annual meeting of the Essex South District Medical Society will be held at the Relay House, Nahant, Wednesday, May 9, 1917, at 6.30 P.M. The meeting will be held jointly with the Lynn Medical Fraternity.

Dr. Robert B. Greenough and Lieut.-Col. W. P. Chamberlain, of the Army Medical Corps, will be the guests. Dr. Greenough will talk on the cancer problem, and Dr. Chamberlain will explain just what the Army service desires of the profession.

E. POIRIER, M.D., *President*.

H. P. BENNETT, M.D., *Secretary*.

**BRISTOL SOUTH DISTRICT MEDICAL SOCIETY.**—Annual meeting in Remington Hall, Fall River, on Thursday, May 10, at 3 P.M.

#### SPEAKERS

Dr. A. Worcester of Waltham: "District Societies."  
Dr. C. L. Scudder, of Boston: "The Cancer Outlook."  
Dr. R. W. French of Fall River: "Three Hundred Gall Bladder Cases."

A. J. ABBE, M.D., *Secretary*.

**HARVARD MEDICAL ALUMNI ASSOCIATION.**—On Saturday, May 12, the triennial meeting and dinner of the Association will be held by order of the Council.

#### PROGRAM

Morning in the hospitals; luncheon at the Medical School, followed by inspection of the departments and demonstration and lecture; dinner in the evening at the Harvard Club. Speakers: Dr. Charles W. Elliot, Dr. W. S. Thayer, Dean Bradford, Dr. J. C. Warren; President F. C. Shattuck, toastmaster.

A complete program will be sent you early in May. Membership in the Association is not necessary but desirable. Save the date and come anyway.

A. B. EMMONS, 2d, M.D., *Secretary*.

**HAMPSHIRE DISTRICT MEDICAL SOCIETY.**—The annual meeting of the Hampshire District Medical Society will be held at Boyden's, Thursday, May 10, 1917, at 11.30 A.M. Presidential address by Dr. C. A. Byrne. Dinner at Boyden's, following the meeting. Censors' meeting at 2 P.M.

JOSEPH D. COLLINS, M.D., *Secretary*.

**WORCESTER DISTRICT MEDICAL SOCIETY.**—The annual meeting of the Society will be held Wednesday, May 9, 1917, at 6.00 P.M., at the State Mutual Restaurant, Worcester. The program is as follows:

1. Dinner.

2. Presentation of reports and election of officers for the ensuing year.

3. Annual oration by Dr. William L. Johnson of Uxbridge; subject "A Physician's Impressions of Florida."

4. Address by the President of the Massachusetts Medical Society, Dr. Samuel Bayard Woodward of Worcester.

5. "Good of the Society"—open discussion.

The censors meet for the examination of candidates for admission to Fellowship, Thursday, May 10, at 2 P.M., in the reference department of the Worcester Public Library. Candidates should bring their diplomas, unless their applications have already been filed with the Secretary and the diplomas verified by him.

The Worcester Chapter of the American Red Cross desires that all doctors holding Red Cross First Aid teachers' certificates register at the local headquarters that they may be assigned to classes. The Chairman of the First Aid Committee also desires volunteers for first aid teaching. This service receives moderate compensation.

ERNEST L. HUNT, M.D.,

*Secretary for the Executive Committee.*

#### MARRIAGES.

ISAAC P. FISKE, M.D., of North Coventry, Conn., was married on April 1st to Miss Annie Marie Schell of the same city.

CORNELIUS E. GEARY, M.D., of Fitchburg and Miss J. Louise Dyer, of Worcester, who is supervisor of district nursing in Fitchburg, were married on April 9, in Worcester.

#### APPOINTMENT.

DR. FRANK T. LOUGEE has been appointed to the position of City Physician of Lynn, Mass., to fill the vacancy caused by the death of Dr. Joseph F. O'Shea. Dr. Lougee is a graduate of Harvard Medical School.

#### RECENT DEATHS.

HIRAM STEERING POMEROY, M.D., died at his home in Auburndale, April 20, 1917, of heart disease, at the age of 69. The son of Oren and Lucinda Pomeroy, he was born at Somers, Connecticut, January 22, 1848. He attended school at Monson, Mass., and entered Yale College with the class of 1872 but was forced to leave college before graduation because of illness. Going abroad, he received the degree of M.D. from the University of Leipzig in 1885, studying subsequently in Prague and returning to America in 1886. Then he settled in Boston to practise the rest of his life. He wrote a book on "The Ethics of Marriage" and a pamphlet entitled "Is Man Too Prolific?"

In 1891 Yale conferred her honorary degree of M.A. upon him. Dr. Pomeroy held membership in the Massachusetts Medical Society, Boston Medical Library, the University, Yale and Congregational clubs; he was a deacon of the Central Congregational Church in Boston and the Auburndale Congregational Church. He is survived by his widow, two sons and two daughters.